THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXVI. No. 1957.] LONDON, NOVEMBER 13, 1900. [52ND YEAR. PRICE 6d.

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Brettell's Estate
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STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.
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SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

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Illuminating Power . . . 16·4 Candles.
Coke . . . . . 68 per Cent.

For Prices, f.o.b. Ship or Delivered by Rail, apply to
The Wallsend & Hebburn Coal Company, Ltd.
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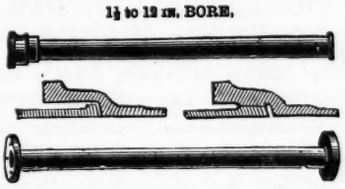
W. RICHARDSON, Fitter.

GAS AND WATER PIPES
1¼ to 12 in. BORE.



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Bonlea Foundry,
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ESTABLISHED 1848.
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For Particulars and Price apply to
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Prices and Analysis of all the Scotch Cannels on Application.

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"ABYSSINIAN" & ARTESIAN TUBE WELLS,
FOR TOWN WATER-WORKS AND OTHER SUPPLIES.

The following Town Water-Works Supplies have been obtained by this System, viz.:—Abbott's Langley, Aldershot, Alnwick, Cirencester, Hertford, Lechlade, St. Albans, Shrewsbury, Skegness, Southampton, Stony Stratford, Swansea, Wallingford, Watford, West Worthing, Wimborne, &c.

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THE "MELDRUM" FURNACE

At "The SHEFFIELD TELEGRAPH" Offices.

Reprinted from "The SHEFFIELD TELEGRAPH" June 27, 1900.

A SAVING IN FUEL OF £18 PER WEEK.

A couple of months ago when coal, which formerly cost us 8s. per ton rose to 12s. 6d., we read a lecture on the cost of steam production by John Holliday, in which the following paragraph appeared:—

Mr. Bryan Donkin, M.Inst.C.E., has published figures from some tests he carried out with different kinds of fuel in the same boiler, the conditions in all cases being the same; the results are comparable on the basis of the cost of fuel required to evaporate 1000 gallons.

Kind of Fuel.	Cost of Fuel per Ton.	Water Evaporated per Pound of Fuel.	Cost of Fuel per 1000 Gallons Evaporated.
	s. d.	lbs.	s. d.
A. Dust Coke	5 0	6	3 8
B. " Welsh Coal . . .	10 0	8	5 3
C. Large " . . .	22 0	9	10 11

Discovering that the Sheffield Gas Company made a considerable quantity of coke dust, which they gave away to builders and others, we entered into a contract for a supply for three years. Having a spare boiler, we had Meldrums' forced draught fitted, and soon discovered that coke dust made a very satisfactory fuel for steam raising. Our second boiler was then fitted, and we are now burning coke dust on the two almost exclusively. From an economical point of view, the experiment is very satisfactory, as will be seen from the following figures:—

Average week, Coal only, on One Boiler.

	£ s. d.
45 Tons at 12s. 6d.	28 2 6
Ashes at 2s., Seven Loads	14 0
	£28 16 6

Present Consumption on Two Boilers.

	£ s. d.
Six Tons of Coal at 9s. 3d.	2 15 6
Coke Dust	3 4 0
Two extra Stokers	2 12 0
Flues cleaning	10 0
Ashes, 12 Loads at 2s.	1 4 0
	£10 5 6

We shall be pleased to show the arrangement to anyone interested in the subject of the economical production of steam. There is no smoke from the chimney stack of the "Telegraph" Office, which is another good point in favour of coke dust as fuel.

Makers and Sole Proprietors: **MELDRUM BROTHERS, LTD.,**
Engineers, ATLANTIC WORKS, MANCHESTER.

LONDON OFFICES: 66, Victoria Street, Westminster. LEEDS OFFICES: 5, East Parade.

Telegrams: "MELDRUM" Manchester, London, or Leeds. National Telephone: Nos. 1674, Manchester; 193, Westminster; 1391, Leeds.

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GASHOLDER & BOILER WORKS,

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WROUGHT AND CAST IRON TANKS FOR DITTO,

PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS, and all kinds of GAS APPARATUS,

Wrought-Iron Roofs, Bridges, Girders, &c.,

Steam, Hot Water, and Range Boilers, Tanks, Cisterns, Boats, and all kinds of Wrought-Iron Work.

DRAWINGS, SPECIFICATIONS, AND ESTIMATES SUPPLIED ON APPLICATION.

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MANUFACTURERS OF **PURIFIERS** OF ALL SIZES,

With Improved Centre-Valves, to work either One, Two, Three, or Four Purifiers at one time.

SLIDE VALVES.

SCREW VALVES.

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GASHOLDER VALVES.

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SELF-ACTING BYE-PASS VALVES.

COMPENSATING VALVES.

UNSOLICITED TESTIMONIAL.

"March 3, 1899."

"Some years ago you made an" "18-inch double covered valve for" "Purifiers delivered to our Works." "We are likely to want another" "for this Station; how soon could" "you supply it, and what would" "the price be delivered here? The" "first one which you made for me," "above 30 years ago, is still" "in excellent working" "order."

Hand-Power LIFTS, suitable for weights up to 10 Tons.

Hydraulic Power GOLIATHS, suitable for any Weights.

Improved WOOD GRIDS for Purifiers and Scrubbers.

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LONDON OFFICE: ST. THOMAS APOSTLE, E.C.

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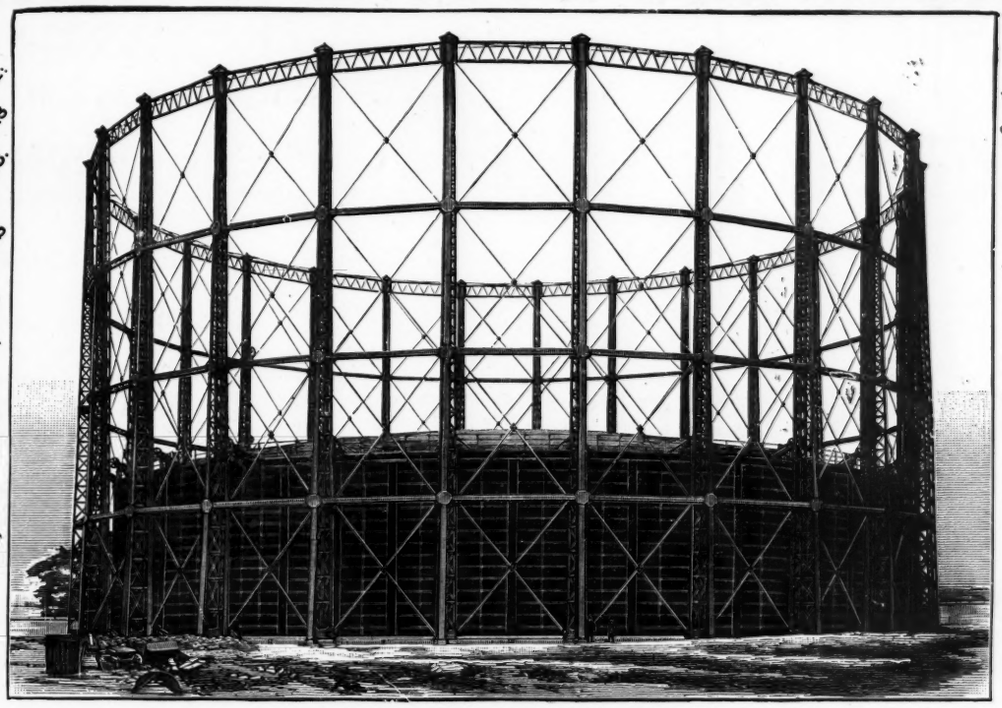

TELEGRAPHIC ADDRESS: ATLAS BIRMINGHAM.

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COVENTRY
WINCHESTER
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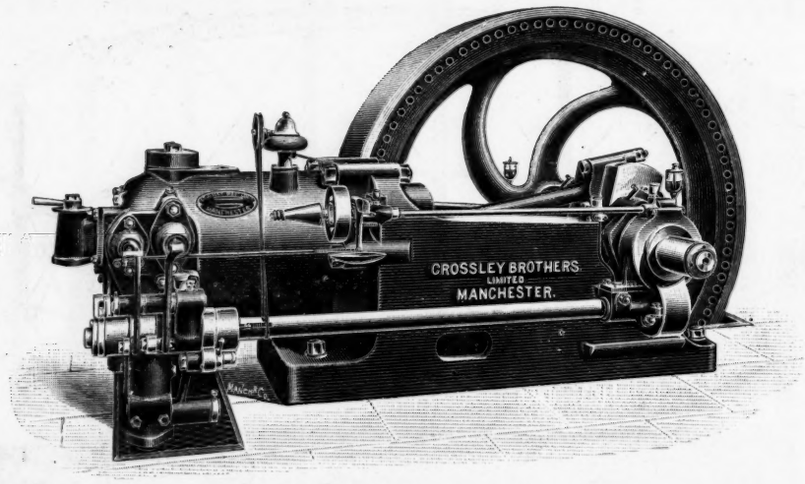

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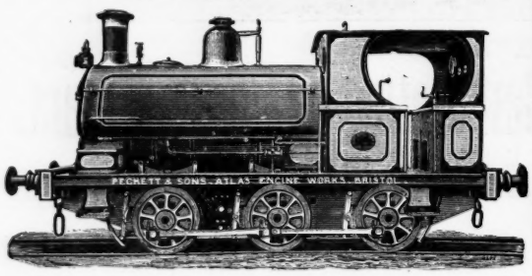

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Manufacturers of every description of

PLANT, APPARATUS, and MACHINERY for GAS and CHEMICAL WORKS.

RETORTS and FITTINGS, MOUTHPIECES with Self-Sealing Lids.

Improved COAL and COKE HANDLING PLANT, CONVEYORS, and ELEVATORS,

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PURIFIERS with Planed Joints a Speciality.

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DESIGNS, SPECIFICATIONS, and ESTIMATES FREE.

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PATENT "NEW" SCRUBBER-WASHER.

IN VERTICAL OR HORIZONTAL FORM.

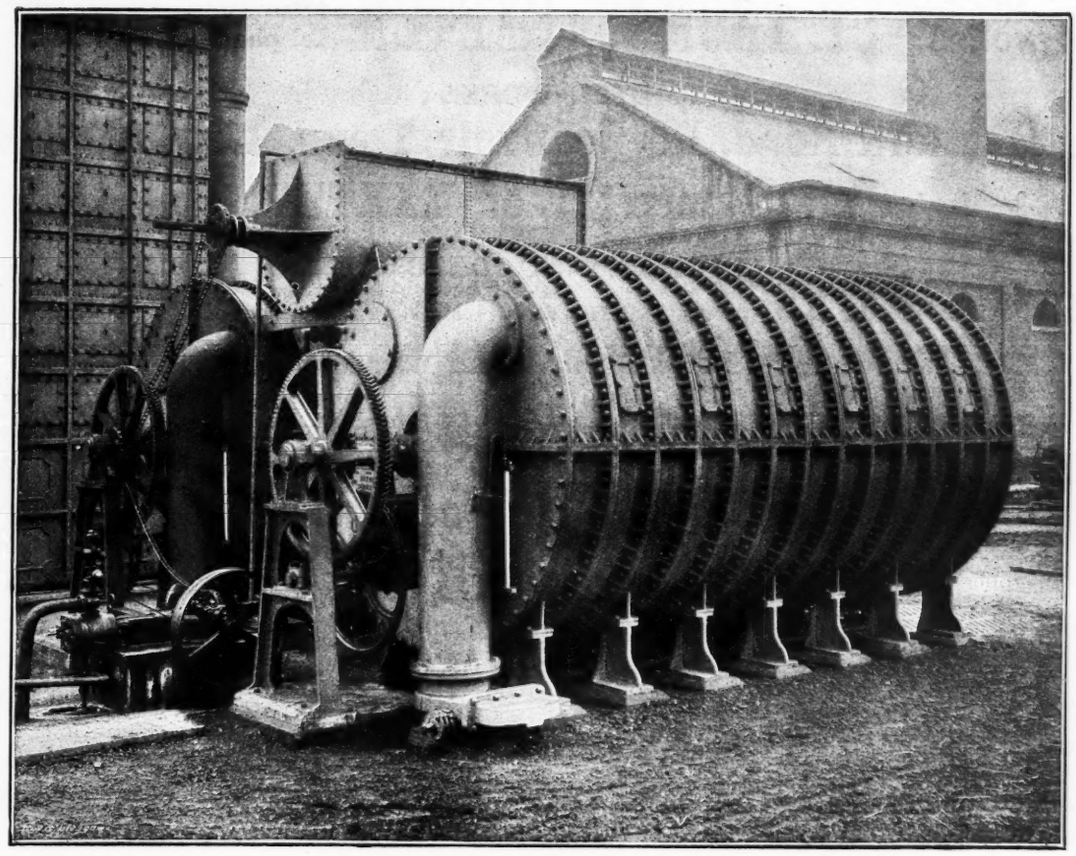

PHOTO. OF CYANOGEN MACHINES.

MACHINES for the **EXTRACTION** of **CYANOGEN.**

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MACHINES for **WATER-GAS PLANT.**

MACHINES ADAPTED FOR BLAST, AND OTHER FURNACE GASES, AND CHEMICAL MANUFACTURING PROCESSES.

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PRACTICALLY NO BACK-PRESSURE. HIGHEST STRENGTHS AND RESULTS OBTAINED.

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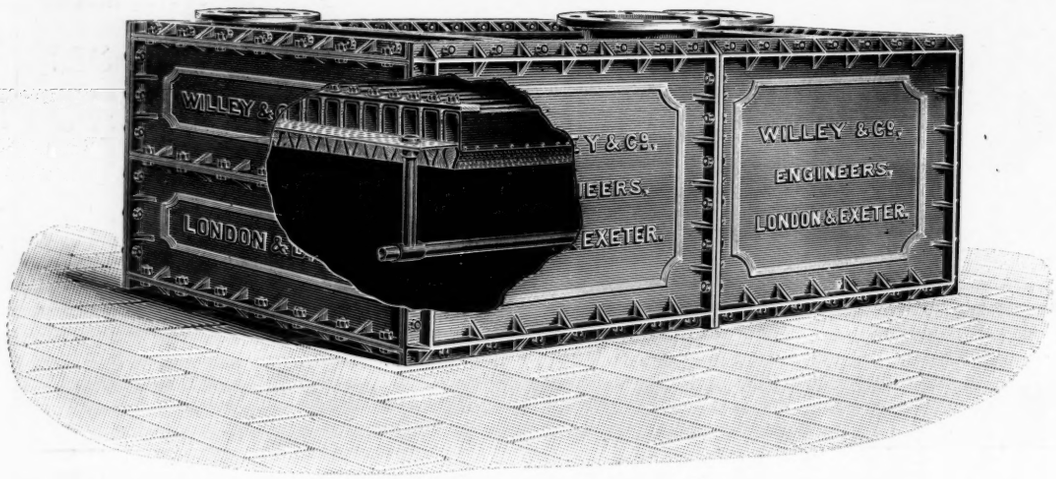

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Manufacturers of

GASHOLDERS, PURIFIERS, WASHERS, and every description of Gas Plant.

Improved Gas Governors, Station Meters, Consumers' Meters, Gas Apparatus, and Gas-Fittings.

SPECIALITY.

Prepayment Meters for any coinage, unexcelled for Accuracy and Reliability.

Tens of Thousands in use, and adopted exclusively by many Gas Companies.

METROPOLITAN GAS METERS, LIMITED,

DRY GAS-METER MANUFACTURERS.

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MAXIM PATENT CARBURETTOR

FOR ENRICHING GAS IN BULK.

OVER **70** MAXIM PATENT CARBURETTORS HAVE NOW BEEN FIXED.

Among the Companies supplied are The Gas Light and Coke Company, The South Metropolitan Gas Company, Birmingham Corporation, Manchester Corporation, Rochdale Corporation, Bristol Gas Company, and many other Works, both large and small, where they have been working in some instances for the past **Seven Years.**

MORE GAS & SALEABLE COKE PER TON of COAL CARBONIZED is PRODUCED; SAVING CAPITAL, LABOUR, FUEL, WEAR & TEAR, &c.

THE ENRICHMENT IS INSTANTANEOUS AND PERMANENT.

The Carburettor is inexpensive, easily fixed, and entirely supersedes the use of Cannel.

SOLE AGENTS FOR REDWOOD & CLOWES' INFLAMMABLE VAPOUR & GAS DETECTORS.

Dealers in Benzol, Carburine, and all other Naphthas and Oils suitable for the Enrichment of Gas.

For Prices and full Particulars, apply to

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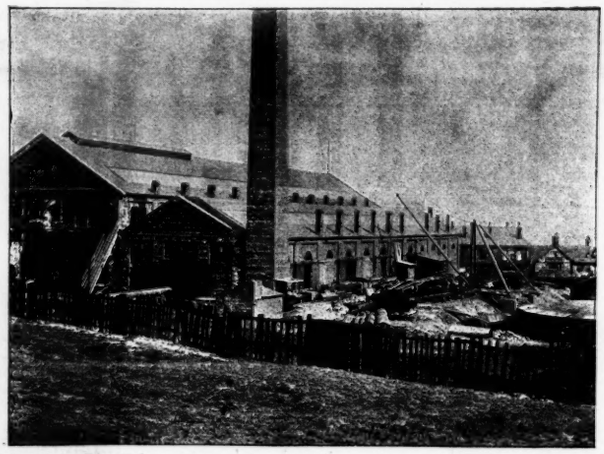

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MANUFACTURERS OF WET & DRY GAS-METERS,

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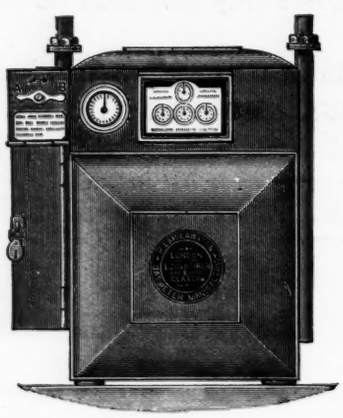

—DRY METER.—

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BRAY'S "SPECIAL" GAS-BURNERS.

UNION-JETS.

SCREWED FOR GLOBE HOLDER.

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These Gas-Burners, fitted on Show-Cards, can be obtained from Factors throughout the World.

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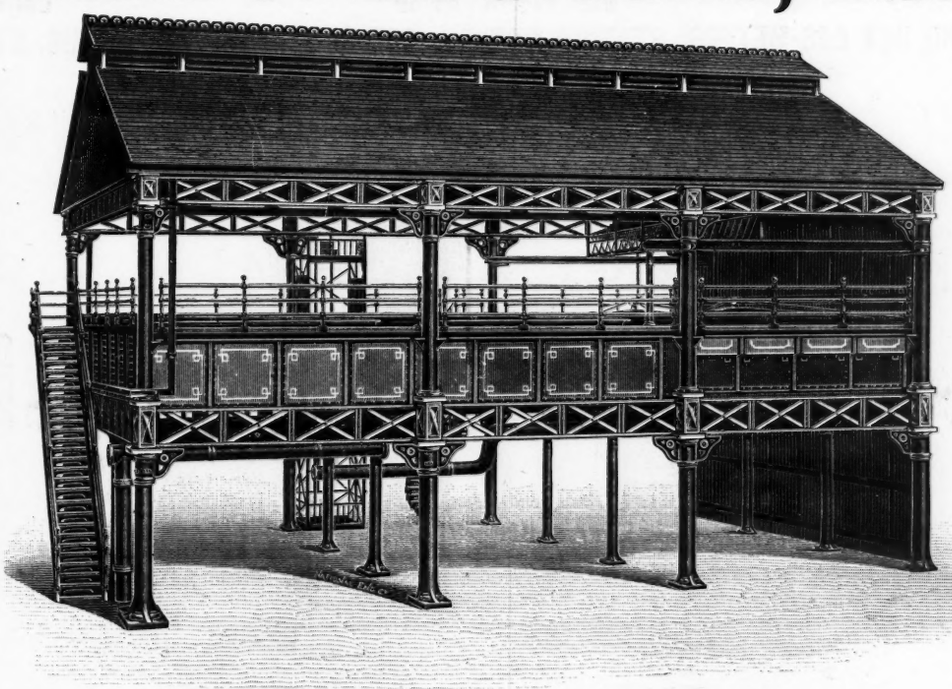

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Carbonizing Plants a Speciality.

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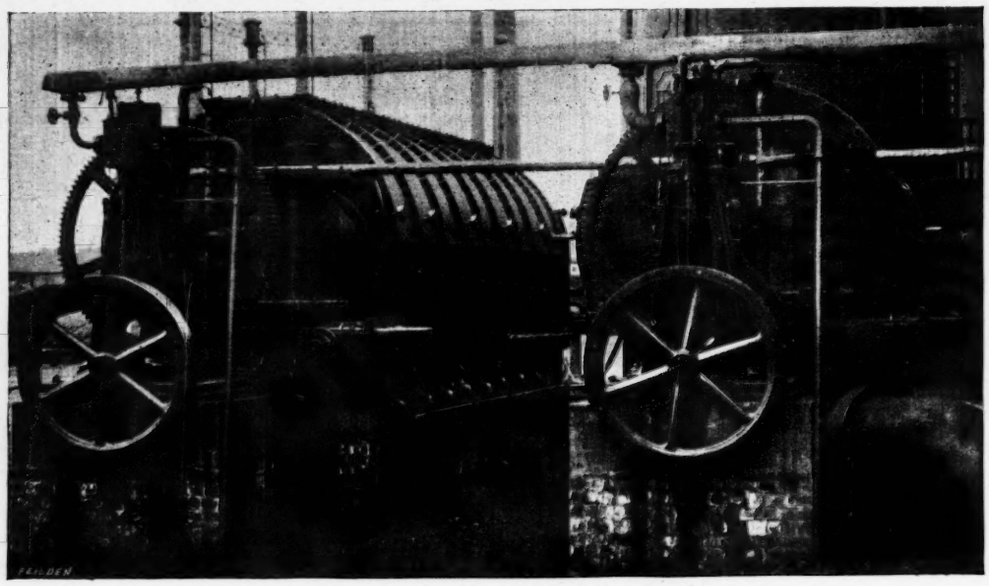
Cubic Feet of Gas per day are now being Purified by

PATENT "STANDARD" WASHER-SCRUBBERS

which extract ALL the Ammonia and a large proportion of the CO_2 and H_2S.

Prevention of Slip of Gas Unwashed.

Strength of Liquor Concentrated.



Maximum Washing Surface.

Easy access to interior.

PHOTO. OF MACHINES RECENTLY ERECTED AT THE SCULCOATES WORKS, HULL.

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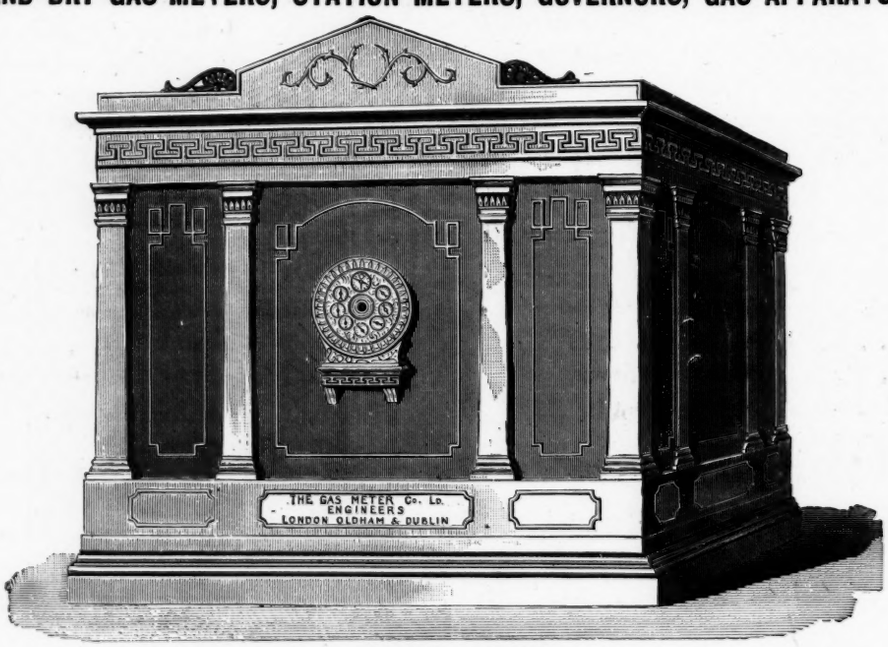
WET AND DRY GAS-METERS, STATION METERS, GOVERNORS, GAS APPARATUS, ETC.

SQUARE STATION METERS WITH PLANED JOINTS.



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STATION METERS MADE AT THE COMPANY'S WORKS, OLDHAM (Late WEST & GREGSON). Established 1830.

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Telegraphic Address: "METER."

[See Advertisement on back of Wrapper.

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CARBURETTED WATER-GAS PLANT

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Copenhagen	700,000	Coventry	600,000	Lawrence, Mass.	400,000
Copenhagen (2nd)	2,500,000	Coventry (2nd)	600,000	Commercial Gas Co.	850,000
Belfast	1,700,000	Bordentown, N.J.	125,000	Commercial (2nd)	850,000
Belfast (2nd)	4,500,000	Winchester	225,000	Commercial (3rd)	1,250,000
Brussels	750,000	Shanghai	225,000	Rotterdam	850,000
Brussels (2nd)	750,000	Stockport	600,000	Dorking	150,000
Liverpool	3,500,000	Norwich	1,000,000	McKeesport, Pa.	500,000
Liverpool (2nd)	4,500,000	Holyoke, Mass.	600,000	G.L.&C.Co., Bromley	3,750,000
Tottenham	750,000	St. Joseph, Mo.	750,000	G.L.&C.Co., Nine Elms	2,750,000
Tottenham (2nd)	750,000	Lea Bridge	350,000	Durham	200,000
Santiago de Cuba	400,000	Lea Bridge (2nd)	350,000	New York	4,000,000
Swansea	750,000	Stockton-on-Tees	500,000	Scarborough	800,000
Manchester	3,500,000	Edinburgh	2,000,000	Perth, W.A.	125,000
Brighton	1,750,000	Guildford	350,000	Bremen	550,000
Preston	1,400,000	Brentford	1,200,000	Maidenhead	225,000
New York	1,200,000	Syracuse, N.Y.	850,000	Epsom	225,000
Southport	750,000	Bridlington	150,000	North Middlesex	150,000
Bath	1,000,000	Middlesbrough	1,250,000	Wandsworth	1,800,000
Newburg, N.Y.	350,000	Croydon	1,250,000	Aarhus	800,000
Newburg (2nd)	250,000	L. & N.W. Ry., Crewe	700,000	Falmouth	150,000
Hoylake	125,000	Taunton	225,000	Southampton	800,000

SINCE JANUARY 1ST, 1899.

Hartlepool	750,000	Stockport (2nd)	600,000	Faversham	200,000
Utrecht	1,000,000	Croydon (2nd)	625,000	Birmingham (Swan V'ge)	1,500,000
Deventer	150,000	Maidenhead (2nd)	225,000	St. Gallen (Switz.)	225,000
Portsmouth	1,000,000	G.L.&C.Co., Beckton	2,250,000	Colney Hatch	400,000
Bournemouth	1,000,000	G.L.&C.Co., Fulham	1,750,000	Southampton (2nd)	500,000
Aylesbury	150,000	Tottenham (3rd)	350,000	Tunbridge Wells	1,000,000
Hamburg	1,750,000	Sydney (Harbour)	500,000	Hebden Bridge	200,000
Redhill	275,000	Sydney (Mortlake)	500,000	Chorley	300,000
Dublin	2,000,000	Manchester (2nd)	3,500,000	Liège	1,000,000
Posen	450,000	Hull	1,500,000	Stafford	500,000
Dunedin (N.Z.)	150,000	Longton	600,000	Bridlington (2nd)	200,000
Lincoln	500,000	Staines	600,000	Gosport	200,000
Antwerp	1,500,000	Commercial (4th)	2,000,000	G.L.&C.C., Beckton (2nd)	10,750,000
Brussels	1,000,000	Dublin (2nd)	2,000,000	Tottenham (4th)	1,000,000
Brighton (2nd)	1,850,000				

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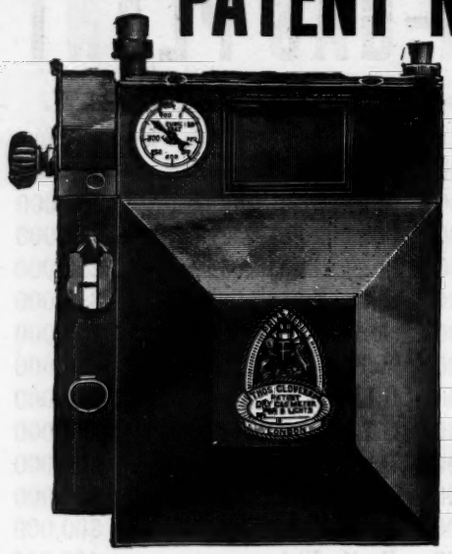

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EDITORIAL NOTES.

The Boot on the Other Leg.

THE outlook in regard to coal grows brighter each week. So welcome is the news, that readers will not need any apology for our returning constantly to the subject, and reviewing the ground for the faith that is in us. There is, indeed, good reason why the hopefulness of the situation should be emphasized, because outward appearances are not at present truly indicative of the existing state of the market, and it is well that the whole of the gas industry should know how matters stand. Quoted prices, that is to say, do not constitute a trustworthy guide; it is only when one can get behind the scenes a little that the remarkable change that has recently come over the relations between buyers and sellers of coal can be fully understood. How remarkable the change is can best be realized by comparing the situation a year ago with that at present existing. In November of last year, the contractors for coal were, with scarcely an exception, heavily in arrear in their deliveries—so much so that at the end of the month some of the very largest undertakings had not a fortnight's consumption in stock. These contractors were, moreover, actually offering their customers several shillings a ton on those arrears as consideration for their cancellation, though we did not hear of a single case in which such an offer was accepted—for not only was it impossible to keep most collieries to the schedules of their contracts, but impossible also to buy any coal in the market, outside of a few odd cargoes of inferior stuff at famine prices. Later in the winter, every gas undertaking in the kingdom was reckoning its coal stock in terms of days—indeed, of hours—instead of in weeks. There is no need to enlarge on the straits to which coal users were put for coal from last November well on into April. They are only too painfully impressed on the memories of most readers. We merely recall them to say: "Look here upon this picture, and on this."

For what is the situation now? It is in every particular reversed. So far from contractors lagging behind with their deliveries, and pleading every reasonable and unreasonable excuse for their failure to supply, they are at present, in more cases than one, actually ahead of their contract engagements—a state of affairs rarely, if ever before, known during the month of November, and only equalled in curiosity by the fact that coal is now to be had for winter delivery at lower prices than in the summer. (Indeed, "summer prices," as generally understood, have been very conspicuous by their absence this year.) Last November, as we have said, contractors were willing to offer terms for the cancellation of arrears. Now—well, all one can say is that if any companies have such rare birds as contractors whose consignments are behind the schedule quantities, let them cancel the arrears; they will have no further cause to complain of lagging deliveries. The experiment has, we know, been most successfully tried by at least one undertaking whose managers some time since accurately gauged the true inwardness of the situation—which may be shortly expressed by saying that "the boot "is on the other leg."

Quoted prices, as we have remarked, are indeed far from representing the real state of affairs. Underselling is going on freely; and although collieries are endeavouring, might and main, to keep up the price by rushing in full contract deliveries, they would be only too glad of more orders. It is a significant fact that in the case of one large provincial gas undertaking, coalowners who did not get in before are making offers at less than the market prices. The truth is that the end of the period during which the coal-owners generally have been masters, and very exacting masters, of the market, has come to an end; and, although the advent of cold weather may for a time stiffen the price of house coals, the ruinous prices of gas coals that have ruled during the past many months must very soon give way considerably.

This alteration in the state of the coal trade has come about from two causes—one the increase in supply, the other the decrease in demand. As to the output, new pits and new seams are being constantly brought into working order. One colliery alone that twelve months ago was lying idle is now turning out coal at the rate of nearly a quarter of a million tons a year; and prospecting has been freely carried out under the stimulus of the high prices ruling. It must, however, be noted as a sign of bad omen

for the future, that there is an avowed movement among the miners to restrict the output, in order to maintain those high prices and the consequent high wages. Yesterday week, a meeting of the South Wales Miners' Federation authorized the Executive to issue a notice to the effect that "with a view to prevent the industry being exploited "by merchants and middlemen, the Council have unani- "mously resolved that a general holiday be taken through- "out the coalfield by all colliery workmen, on Friday, "Nov. 9." In one of the journals of the trade it is said that the coalowners are "not in agreement as to whether "the trade will be benefited or not by this artificial remedy "to keep up prices." We can only say that those who doubt the fatuity and disastrous consequences of such a policy will soon learn by dear experience.

They must indeed be blind or unreasoning, as nothing is more obvious at the present moment than that the high prices to which fuel has been run up are seriously damaging the very trades upon whose custom the collieries depend for their prosperity. The state of the iron and steel trades is daily becoming more serious for those interested therein; for, while the abnormally high price of iron—Scotch warrants stand at 67s. which in January, 1898, were at 45s. 4d. —is opening wide the door to foreign competition (as witness the falling off in the export trade and the large purchases of American iron by Scotch shipbuilders) and is killing business, yet fuel is so dear that the cost of production is too great to admit of any material reduction in prices without the disappearance of all profits. The longer, then, that coal is, by either artificial or natural means, maintained at its present level, the more serious will be the effect on the iron trade, and the less will be the demand for coal. The closing of the Barrow Hematite Iron and Steel Works—a step which has been taken in consequence of "slackness of orders, the cost of fuel, and the reductions "in prices necessary to meet American competition"—should be a warning to coalowners who still need one.

Whether, however, the coalowners learn wisdom or not, it seems only too apparent that the economic ignorance of the coalminers' organization is "proof and bulwark against "sense;" and one cannot but look upon the future with some misgivings when the present temper of the men is considered. It may not have attracted the notice of many of our readers, but in Wales, and some other districts, there has of late been a succession of strikes of short duration, or threatened strikes, all having, and achieving, the same object—namely, the forcing of non-unionists into the Union. The masters have preferred selling coal at huge profits to risking a fight. But they, and coal consumers, will pay the price some day; while, as a sign of the times, the men's action is by no means welcome. The inevitable heavy fall in their wages next year will create a situation of no little anxiety.

Apart, however, from the possibility of labour troubles, the outlook for coal consumers is decidedly bright, and a considerable fall in price is certain in the near future. But for the continuance of the abnormal exportation of coal (as to which we give particulars in another paragraph to-day), that fall would have taken place weeks ago, as the home market has been failing for some time. Meanwhile, the best advice we can give to the gas industry is to buy no more coal, and certainly no farther ahead, than is absolutely necessary.

The Problem of the British Gas Engineering Profession.

No excuse is needed for returning to the all-important topic of the character of the personality of the British gas engineering profession. We have nothing to withdraw from, or qualify in, our "Editorial Note" of the 16th ult., which has evoked some letters well deserving the publicity we have gladly afforded them, and has also brought us private expressions of approval from representatives of both parties concerned for the satisfactory solution of the problem in the future. We find it desirable, however, to explain that those who are actually suffering, or who may suffer in their own persons, from this "riddle of "the painful earth"—the apparent hopelessness of matching reward to deserving—must bear their lot with such patience as they can command. Surely, no assurance is needed to persuade victims of the "slings and arrows of "outrageous fortune," that our references to the whole case of the gas engineering profession of this country are inspired by the keenest sympathy for those to whom Fate has denied adequate opportunity for the exercise of their powers. But the calling of a gas manager is not singular in this respect. It is, indeed, a constantly-recurring theme of poetry and philosophy of all ages and climes.

As practical persons, therefore, let us confine attention to the remediable portion of the evil. We were glad to see one correspondent quoting an earlier "JOURNAL" article dealing with the worst weakness of municipal service. That is certainly a matter ripe for reform, in the best interests of the public as well as of the professions implicated. We are, as a nation, rightly proud of the honourable character of our Civil Service; and, on the whole, the example of this service has been followed in the more numerous local government executive. But, in the latter, the particular kind of skill known as ability to "take the length of the "chairman's foot" still possesses inordinate value. There are, of course, numerous honourable exceptions; and this particular mischief is by no means confined to municipal service. In the past, as we are reminded, the calling of gas management has suffered from the low view too frequently taken of the necessary qualifications for this employment by both company directors and municipal councillors. Perhaps in no other avocation are such diverse local opinions entertained and acted upon with regard to the rating and remuneration of holders of appointments of the same general order. In one town of moderate size, the gas-works manager is "a citizen of credit and renown." Able, respected, trusted, he is as honourably identified with his town and its gas undertaking as a man could wish to be. What matters it if he is not one of the very "big men" of his profession? Is their lot so enviable? Not a bit of it. If a gas manager, or any other man, has enough of the world's gear for his needs, and is the right man in the right place, he can regard his career as a successful and creditable one, and himself a happy man in his professional life. On the other hand, a few miles away, perhaps in a larger town, the gas manager has no chance at all. His berth is "no class," as the phrase goes. It is a painful subject; but the facts cannot be overlooked.

How is it that a few well-known undertakings are as colleges for turning out capable, worthy young gas engineers, so that their graduates occupy good posts in all parts of the country, while of others no sound is ever heard in technical circles? As we have already admitted, it is not the largest gas-works that make the best schools of gas management; but we do think that many of these huge establishments are to blame for not doing enough in this way. Whether it is that the head and chief for the time being does not like to have professional brethren too near his throne, or whatever the reason, the truth remains that there are big gas undertakings in this country from which no good man ever emerged for promotion to independent command. The result is that, when an actual successor, or heritor presumptive, for the great man is wanted, there is trouble in finding him. These and other familiar drawbacks to the efficient future manning of the gas profession ought to be removed. Above all, it should be made known among the right sort of young men entering the world of affairs that, with all their disadvantages, gas engineering and gas-works management are not avocations to be despised as unscientific, repulsive, or in any way unworthy of the cleverest and best men, with the right bent, of their generation. This last is our point.

Midland Association Meeting—Gas-Meter Union Standardization.

THERE was a resuscitation of the question of the standardizing of gas-meter unions at the meeting of the Midland Association of Gas Managers last Thursday, after almost everybody had thought it had been finally shelved. The President (Mr. J. Ferguson Bell, of Derby) was responsible for this fresh endeavour to arouse interest in the matter; and next to what has already been done by the Committee of the North British Association, his effort will stand conspicuously prominent. We have before acknowledged that everything Mr. Bell takes in hand in connection with his profession he does particularly well; and this is another instance. The compilation of the tables showing the variations which exist in the unions of different makes of meters must have involved an immense amount of labour. Indeed, they are really the soul of his communication; and we venture to think that their study will do more to incite interest in the question than anything that has yet been done. One thing the tables disclose is that the variations in the case of dry meters are of such an insignificant character that the meter makers might, simply by a friendly

compact, conform them without detriment to themselves, and certainly to the benefit of the gas authorities. Wet meters are clearly shown to be the chief transgressors; and in their case a radical reform would be an undoubted advantage. Mr. Bell suggests that the best standard for both wet and dry meters would be the Whitworth thread, and that all connections up to 5-light meters should be of one size. But in seeking the best way of obtaining uniformity, there are several matters which require consideration; and care must be taken that the reformation is not carried (as is quite possible) a little too far. In the discussion, nearly all the speakers agreed with the principle of uniformity; but they did not take kindly to all Mr. Bell advanced or proposed. However, the very terse and plain manner in which he presented his views was effectual in drawing out one of the most readable discussions we have ever reported on the subject.

A number of meter makers representative of the trade North and South attended the meeting by invitation; and some half dozen of them stated the feelings of the manufacturers on the question with such unmistakable clearness, that it will be a sheer waste of time to trouble them again in connection with the matter until the day arrives—if ever it does arrive—when a Committee invested with due authority from the gas suppliers of the country can meet them to actually settle upon a uniform series of unions. Bereft of their argumentative dressing on points raised in the paper, the speeches of the meter makers amounted in sum and substance to this: "If the gas authorities will collectively, through some representative body, tell us what "they desire, we are willing to comply." More they could not say; and this has narrowed down the question to one entirely for settlement by the suppliers of gas. They have simply to unitedly command, and the meter makers will obey. Therefore, if gas suppliers really desire an alteration, let them now distinctly say so. When the project for unification was raised in Scotland, it was sent out with high hopes; but it was dragged wearily about through the country. There was a great deal of favourable talk; but after the talk, supineness—the net result being that our friends across the Border had to take the wanderer home again, and make the best of it they could for their own benefit, aided by the Edinburgh meter makers. If, as the result of Mr. Bell's paper, the matter is revived, let it be in a proper and adequate manner. Let either the Institute or the Institution show that they have the interests of the gas industry sufficiently at heart to bear the small expense and trouble of circularizing every gas company and committee in the country, and ascertain what is the actual feeling on the subject. Then if a majority declare themselves in favour, let a Committee be formed of representatives from the leading gas undertakings and meter manufacturers to decide on a set of unions for standardization, and present it in suitable form for the acceptance of the Board of Trade. Such a Committee, backed and authorized by a majority of the gas industry, would, we think (in view of past action and interest in the matter in that quarter), carry the Board with them. On this point we would call special attention to the remarks of Mr. J. L. Cloudsley in the report of last Thursday's debate. It is unnecessary to discuss here the *pros* and *cons* of the general question. There are arguments both for and against standardization; but the balance is turned well in favour by the weight of convenience alone. If standardization is really required, let there be no more half-hearted trifling with it.

Beyond the paper and debate, only matters relating to the executive work of the Association occupied the members. The choice of officials for the ensuing year was a particularly happy one. Mr. Thomas Glover, of West Bromwich, who is a zealous worker both inside and outside the Association, will be the President, and Mr. Charles Hunt, who was practically the founder of the Association, the Vice-President; and, in the ordinary course of events, he will be called upon to preside over his offspring in the year which sees the completion of the first quarter of a century of its work—work which, in character and degree, stands well in the records of the District Associations.

Glasgow Decides for "Light Gas."

It is with much satisfaction that we hail the resolution of the Corporation of Glasgow to apply for parliamentary powers to enable them, in the event of their finding the course expedient, to reduce the standard of illuminating power of their gas from 20 to 16 candles. The Corporation Gas Committee and their Engineer (Mr. W. Foulis) are to be congratulated upon their public spirit and independence of judgment. Mr. Foulis, as all the world knows, is a pioneer in this line of industrial progress. Everybody does not know, however, although most of his professional colleagues can imagine, how many and varied were the obstacles, overt and secret, to be overcome by Mr. Foulis in thus breaking with the tradition of Scottish gas manufacture. The cannel coal interest, naturally, was against him to a man. It was more difficult to make the first breach in the old rule of the trade than to demolish it altogether, as has now been accomplished. The first reduction of the standard of illuminating power was as a step into an unknown land, where all sorts of pains and troubles might be met with. Any amount of trouble was, indeed, cheerfully predicted for the Glasgow Corporation; but these presages of woe were braved, with the result that nothing came of them. It is only the first step that is difficult and doubtful. Now the Gas Committee are experienced in the matter; and they know that the public will never notice any difference in the character of their gas supply, except that it will probably be cheaper. The case laid before the Corporation by Mr. R. M. Mitchell was conclusive; and not a dissentient voice was raised against the Gas Committee's policy.

It might well be wished that the Glasgow Corporation could now set the example of dropping the old convention of standard illuminating power altogether. They could do it. What Glasgow and the rest of the world wants is coal gas of the calorific power of (say) 600 units per cubic foot. This, with no sulphuretted hydrogen, no ammonia, as little carbonic acid as may be, and not over 16 per cent. of carbonic oxide, is the article that the public would demand, if they knew what is best for them in this regard. How to make this gas and deliver it to the consumer at a good pressure, at the lowest possible cost, ought to be the chief study of gas-works administrators and managers. This is the criterion which emerges from all that has been said and done these years past in the interest of the gas-consuming public. Nothing but national fondness for red tape prevents the free development of the British gas industry along these truly economic and sanitary lines. Gas-engines supplied with this gas would beat electric power, whether generated in bulk or in little, out of sight. It is what gas-fires and gas-cookers and water-heaters need. They certainly do not want a continuance of the existing inequality of gas supplies in different towns. And, of course, it is notorious what incandescent systems of gas lighting require for their fullest development. Marching already towards the future when the luminous-flame burner will be the rare exception, the progress of the systems will make a bound forward when the superstition of carburetted gas is definitely shaken off. If the credit for the invention of the incandescent system of gas lighting cannot be claimed for Britain, we can at least excel all countries in the cheapness of its utilization. Let the people have the benefit of this happy feature of the British gas industry, by freeing the manufacture from every artificial restraint on its capacity for almost indefinite expansion!

Mr. James Mansergh and the Institution of Civil Engineers.

The Institution of Civil Engineers provided last Tuesday a great treat to members and that section of the community which is interested in hearing about engineering work, in the Inaugural Address of the new President (Mr. James Mansergh). It has been our painful duty, on some occasions, to write disparagingly of addresses from the Chair of the Institution. Indeed, for that matter, our reverence for the Institution itself, as a professional organization, has not been overwhelming. The very name of "Great George Street" has fallen into disrepute of late years, as suggesting an order of engineering which benefited its practitioners more than the community at large. Time and again, working engineers who wanted to get to closer grips with their speciality than they could do under the shadow of the "big-wigs" of the Institution, split off into sectional societies. The valuable consideration given by the Institution to its rank and file in return for subscriptions was the more or less marketable distinction of the initials indicating the classes of membership. There was nothing more. The "big-wigs" merely played up to one another, and kept all young men at a distance; and no sort of discipline was exercised over the body of members, some of whom had, and have, strange ideas of the

limits of professional etiquette, or even of common fairplay as between man and man. In recent years, however, the composition of the Council of the Institution has submitted to a much-needed change for the better; and the Institution has set its house in order in more than one sense of the term. The credit for this improvement is largely due to the rise of engineers of the stamp of James Mansergh, to whom the old-fashioned practice of Great George Street is abhorrent. Not to labour the point, these engineers, who have more honoured than been honoured by belonging to the Institution, have not only rehabilitated it, they have also redeemed the reputation of English civil engineering before the world.

Mr. Mansergh's address revealed the man. Intensely practical, poignant in every line, without a superfluous word, it is inadequate to merely say that there is no padding or mere rhetoric in it from beginning to end. Yet, astounding to relate, this working engineer brought into prominence a gem of classic Roman literature which vastly impressed the scholarly "Times." This was a fragment of Frontinus, a Water Commissioner for Rome appointed by the Emperor Nerva, and set out with unsurpassable cogency the duty of a public man entrusted with the conduct of any important undertaking. The bulk of the address was devoted to various ancient and modern aspects of hydraulic engineering, and is consequently removed from discussion here. Of general interest, however, is Mr. Mansergh's emphatic declaration of the conditions under which the London Water Companies can alone be expropriated. The desirability of the London Water Supply being placed under the control of a public authority being accepted by Parliament in principle, there is no reason in the world why this should not be done, if it is thought to be worth while, by a competent local authority to be created for the purpose. Only, the property must be paid for, like all others of a similar kind. Mr. Mansergh condemned the harassing and worrying policy of the London County Council in regard to the Water Companies; and his weighty words on this subject will perhaps contribute to the formation of a firm basis for fresh negotiation with the object which, in principle, he commended.

Coal and Iron Exports.

THE reports of a falling off in the exports of coal, to which reference was made last week, are not borne out by the Board of Trade returns for October. The total quantity of fuel shipped last month is, it is true, somewhat less than the figure for September (being 5,113,972, as against 5,140,708 tons); but compared with the corresponding month of last year the shipments in October show an increase of 544,927 tons, or 12 per cent. The requirements of Germany and France are at present unabated; and a somewhat serious strike of miners in the latter country will certainly not tend to improve matters. The Baltic is practically closed for the winter; so that the volume of the exports may somewhat diminish. But there is every appearance of its being maintained at a very high figure for some time to come. The increase for the ten months of this year is now almost exactly 2 million tons, as compared with the same period in 1899, which year showed a total excess of no less than 7½ millions over 1898, owing largely to the strike in Wales during the last-named year. The influence that an additional drain on our coal supplies of about 10 million tons a year must have upon the market until the output is correspondingly increased, needs no demonstration.

The falling off in the exports of iron and steel is as noticeable a feature in the returns for last month as the increase in the shipments of coal. The tonnage of metals and articles manufactured therefrom, other than machinery and ships (of which the weight is not given) was only 275,764 tons in October this year, against 370,539 tons in the same period of 1899—a decrease of over 25 per cent.; while the aggregate exports under that heading for the ten months is practically the same for both this and last year, though the first half of this year showed an increase of 306,500 tons over 1899. These returns, following upon those for September, prove how seriously the high prices of iron and steel goods have damaged the trade of the country. In spite of the higher prices, indeed, the value of the exports of metal goods (including machinery) shows a falling off of £307,784 in October.

Not a little of this diminished trade is due to the encouragement given by high prices to foreign competitors. When first we wrote upon the subject of the probable serious competition to be looked for from American rivals, the organs of the engineering and iron trades in this country were very scornful of the possibility of the Americans capturing English markets. Some of them are now talking about "increasing and well-founded fears of a deluge "of American pig iron;" "the necessity of reducing prices "to meet American competition;" "plates offered in our "markets at prices which English makers are unable to "entertain," and so forth. Only the other day, a contemporary waxed wroth when it was suggested in the Daily Press that orders from South Africa were going to the United States because British firms could not undertake them; and we were told that such orders were simply allowed to go because the British manufacturers were too full of work to undertake the contracts. Yet it is now said that, "as "work is getting short, competition is getting keen," and the position of manufacturers is steadily getting worse.

No one will accuse the "JOURNAL" of ever imagining that the competition of America or Germany is going to wipe out the industries of this country; we have too much faith in the grit and resource of our countrymen to think that. But it is simply idle and foolish to deny that English manufacturers have leeway to make up in regard to adopting improved methods and machinery; and that the increased cost of production and the inflation of prices in this country have given their competitors a very valuable opportunity, which they have been quick to see and to take. Consumers, as distinguished from producers, have every reason to hail the advent of competition which will prick the bubble of present prices, and will, eventually, by its arousing and sharpening effect, be an advantage to the manufacturers themselves. More immediately, it will be of much assistance in restoring the coal and iron markets to normal levels.

The Sad Case of Alderman Higginbottom, of Manchester.

SOMETHING very like a tragedy, in respect of the fashionable "principle" of municipal trading, has occurred in Manchester—the city of the United Kingdom, next to Glasgow, usually held up as the model of this order of municipal enterprise. The Lord Mayor designate (Alderman Higginbottom) has retired from municipal office, and forfeited the penalty of £50 for resigning the position of Alderman, in consequence of the finding of a Special Committee appointed to inquire into certain allegations published by Mr. Norbury Williams, one of the Elective Auditors, relative to the dealings of the Alderman's firm—Messrs. Higginbottom and Mannock, Mechanical Engineers—with the Gas and Electricity Departments of the Corporation. Alderman Higginbottom was Chairman of the Electricity Committee, and a member of the Gas Committee of the Corporation. Mr. Norbury Williams issued an address to the ratepayers of Manchester, in which he not only made specific charges of mismanagement of business against the Electricity Committee calculated to horrify a believer in the "principle" of municipal trading, but also charged the Chairman personally with improper conduct. The Alderman was alleged to be in suspicious relationship with certain companies who supply the Committee with plant; and he was charged with having, as a member of his firm, sub-contracted for the selling of cranes required by the Gas and Electricity Committees. We have had information about all this for some little time, but naturally waited for the matter to come to a head before publishing anything of the affair.

Mr. Williams's attack was met by Alderman Higginbottom with a disclaimer of intentional misconduct, which nobody mistrusted for a moment. The Electricity Committee, however, had taken the wise course of immediately appointing a Special Sub-Committee "to consider and report upon "the administration of the Electricity Department;" and the City Council waited for the report. It is a portentous document. The investigation showed that a good deal of the administrative work of the Department never came within the cognizance of the Committee at all. A very lax way of doing business had become customary. Meanwhile, a Special Committee appointed by the City Council to deal with Mr. Williams's personal allegations against the Lord Mayor designate, went into the matters in question. They found, shortly, that there was nothing in the greater number of Mr. Williams's imputations. So far as these related to Alderman Higginbottom's company connections, they did not amount to anything. It was different, however, with respect to the cranes. Here it transpired

that the sub-contracting of Higginbottom and Mannock was "altogether improper," and such as the Committee could not justify, having regard to Alderman Higginbottom's position upon the Electricity and Gas Committees. The Alderman promptly accepted the situation, and took the only course open to him in the circumstances.

The whole result was inevitable, from the precedent facts. It was not a question of whether Alderman Higginbottom's firm had swindled the city, or whether the Alderman had abused his position to secure an unfair commercial advantage over rivals in business. His action was simply illegal, and, as the Committee described it, improper; and he has suffered for it. Mr. Briggs, the retiring Lord Mayor, adds to the burden of Manchester's indebtedness to himself for faithful services rendered, by consenting to serve for another year; and the local statesmen are now left to brood, with what comfort they can find, over this "regrettable incident" of municipal trading. It is not to be wondered at that this is the permanent, serious aspect of the matter which is affrighting Manchester's conscience. Alderman Higginbottom is personally an honest man. Nobody questions the fact; but, as the "Manchester Guardian" has very properly observed, that is the worst of it. If an honest man might do the things Alderman Higginbottom did, what might not another do?

The trouble of this thing goes deeper than the personal sufferer, deeper even than the wound of Manchester's dignity. It may be, as the local newspapers say, that the City Corporation have come through the painful ordeal purified and strengthened; but what about the reputation of the "principle" of municipal trading? There must be many a citizen of Manchester this day who wishes in his heart that the Corporation had no trading enterprises. As Alderman Southern said with truth when his brother Alderman was first put upon his defence, it is difficult enough for any merchant to know when his goods are destined for Corporation use. Where will the Corporation be, if the leading members of an industrial and commercial community are driven from municipal life by this terror? It will be practically impossible to find men in active business to take part in municipal concerns, which will be left to the "professional" element in local politics; and we all know what that means. "Each municipal election "shows how difficult it is to obtain the consent of pro-"minent citizens to come forward as candidates." And this is said of Manchester, whose local patriotism is often thrown at the head of heedless London ratepayers whenever the newspapers have nothing better to do! The natural and obvious lesson of the Higginbottom incident—that there is something yet to be said in favour of leaving business affairs to business organizations—has not yet been expressed outside these columns. It will be repeated, however, whenever this subject is ventilated again. A gas or electricity supply company can purchase the supplies they require in the best and cheapest market. A municipal department dare not do so, if it happens to be the Lord Mayor who keeps the leading shop. It is the system which is wrong, as the "Manchester Courier" remarks; but we go to the root of the matter, and declare that the system which needs to be reformed is that of municipal dealings in things which are not necessary to sanitation and town administration. Of course, being Englishmen, and born to compromise matters, our public men do not lay the axe to the root of the tree; but that is what is wanted to prevent any possible recurrence of these municipal scandals.

Among the medals adjudicated by the President and Council of the Royal Society, and approved by Her Majesty, is the Copley Medal to Professor Marcellin Berthelot, one of the foreign members of the Society, for his brilliant services to chemical science. The medals will, as usual, be presented at the anniversary meeting of the Society on the 30th inst.

The current number of the "Contemporary Review" contains an interesting article on "Gas Light," in which is reviewed, with absence of technicality, the progress of this wonderful illuminant from the days of Murdoch down to those of the Welsbach light. The article does not bear the name of the author, who conceals his identity under the pseudonym of "Ex Fumo Lucem."

The recent Ministerial changes include the transference of Mr. Walter Long from the Board of Agriculture to the Local Government Board, in succession to Mr. Chaplin; and the appointment of Mr. Gerald Balfour, the younger brother of the leader of the House of Commons, and a nephew of the Prime Minister, as President of the Board of Trade, in place of Mr. Ritchie, who goes to the Home Office. Mr. Long has been Parliamentary Secretary to the Local Government Board.

WATER AND SANITARY AFFAIRS.

Last Tuesday was a memorable—we will not say a red-letter—day in the history of the Metropolitan Water Question. In the afternoon, the Water Committee of the London County Council laid before that body the report given in the "Journal" last week (*ante*, p. 1160), in which they recommended that an attempt should once more be made to obtain power to purchase the undertakings of the Metropolitan Water Companies. This recommendation will, in all probability, be adopted at the meeting of the Council to-day; and, if so, the Parliamentary Committee will be instructed to prepare the necessary Bill, as well as one to prolong the period during which what have come to be known as the "sterilization clauses" shall remain effective, which has already been approved by the Council. As far as the future additional supply of water to the Metropolis is concerned, the Committee do not recommend the promotion of any Bill dealing with this branch of the question. The parliamentary programme of the Council for the next session is thus clearly defined—a Bill to sanction purchase, and another to continue the "sterilization clauses." We do not believe that either will pass; nor, as regards the first, do the Committee themselves appear to be very sanguine on the matter, for they candidly confessed that they "may be unsuccessful." Moreover, they are careful to point out that the expense up to the second reading stage will not exceed £200—a mere trifle in comparison with the heavy expenditure already incurred in connection with this question. But is there any justification for even this outlay? The Committee attempt to justify their recommendation by citing the report of Lord Llandaff's Commission in support of the policy of purchase; but they are careful not to say that the Commission also recorded the deliberate opinion that the Council should not be the purchaser. Consequently, the views put forward as to what should be the basis of the arbitration need not be considered.

Of far greater importance than the proceedings at Spring Gardens were those which took place a few hours later at the Institution of Civil Engineers, in Great George Street, where Mr. James Mansergh, the new President, opened the 82nd session with an address which, for interest in connection with the special branch of engineering with which for nearly forty years he has been associated, is worthy to rank with those delivered by the eminent men in the same line who had preceded him in the chair of the Institution—Simpson, Hawksley, Bateman, Bazalgette, and Rawlinson. It is unnecessary to give here even an epitome of the address, a large portion of which will be found in another part of the "Journal;" the exigencies of space necessitating the omission of the valuable particulars furnished in regard to the most important water-works of ancient times (especially the aqueducts by which Rome was supplied), and some observations on the work of the water-finder. To these subjects, however, we may return on a future occasion. Our present purpose is to deal with debateable rather than with either historical or psychical questions. Attention must, however, be directed to his opening remarks on the effect of prolonged storage and slow sand filtration on the quality of water, and to the labours of Koch and Percy Frankland in the field of bacteriology in connection with its examination; also to the valuable suggestion he threw out in reference to making some change in the law with regard to underground water, which is acknowledged to cause a great deal of hardship, but is difficult to amend.

Probably the most significant portion of the address was that with which it closed, in which Mr. Mansergh dealt with the policy of municipalizing water-works and the bearing of the question upon the Metropolis. As a member of a former Royal Commission, and as the Engineer of the great scheme for bringing to Birmingham a supply of water from Wales, it was to be expected that he would have something to say on the subject. He introduced it by briefly describing, by the aid of lantern slides—an innovation which heightened the interest of his remarks—the water-supply systems of fifteen typical cities in the United Kingdom, Europe, America, and Australia; leaving the details for an appendix. The selection made brought out the striking fact that, out of all the cities whose works were shown (with a partial exception in Rome), in only one—London—is the water supply in the hands of private Companies. This fact the President considered was a

justification for expressing his own views—viz., that all the fourteen places are right, that London is wrong, and that the recommendation of the last Royal Commission as to placing the undertakings of the Water Companies in the hands of "some representative public body" is "in accord with the best official, parliamentary, and public "opinion of the day." That the supply of water should be one of the distinctive functions of the responsible sanitary authority of a district is, he submits, a principle the soundness of which is incontestable; and, moreover, it agrees with the recommendations of Royal Commissions and the practice of Parliament during the past thirty years. Why has this principle not been applied in London? Because, in Mr. Mansergh's opinion, of "the wrong-headedness of the "London County Council, through endeavouring in every "possible way, and with pertinacious ingenuity, to de-"preciate the value of the undertakings prior to purchase." This is a very strong indictment, and its absolute truth adds force to it. There are certain features of the business of the Metropolitan Water Companies which possibly present difficulties; but Mr. Mansergh has never seen any essential difference between the case of London and that of any other place where a settlement has been come to either by agreement or by arbitration. He acknowledges that the amount of the purchase-money will be very large. This, however, is only a matter of arithmetic, as "no new or "unusual principle comes in to complicate the awarding of "fair and just compensation as between the parties." But who are to be the buyers? Not the busybodies at Spring Gardens, but a specially constituted authority; and Mr. Mansergh thinks that, with some alteration in numbers, and with power to vary them at fixed periods according to the relative populations of the districts they represent, the Water Board recommended by Lord Llandaff's Commission is "a workable scheme."

After this pronouncement from so eminent an authority, it really seems that the ground is cleared for negotiations with the object of settling for ever this question of the control of the Metropolitan Water Supply. The initial step in this direction, it seems to us, is to determine who are to negotiate. It is scarcely to be supposed that the London County Council will be authorized to do so, if the property to be acquired is not to remain in their hands. Consequently, the first thing to be done will be to constitute the suggested Water Board; the next, to settle the basis on which the negotiations are to be opened. As far as the Water Companies are concerned, their position is just this: They are in possession of their undertakings, and no grave charge of mismanagement has been brought against them. If their property is to be taken from them, they expect to be treated as other similar companies have been dealt with in the past—that is to say, to receive for it a sum which shall have been determined by arbitration under the Land Clauses Consolidation Act, *plus* an allowance for compulsory sale, and fair compensation for future profits. If, therefore, their present income and an allowance for future profits were secured to them upon the rates of London, with a *solatium* for compulsory sale and full compensation to all persons injured by the transfer, a basis of sale might possibly be settled. This, if we understand aright, appears to be the view taken by Mr. Mansergh, for he considers the owner of a water undertaking would have no cause to complain if, on its transfer to a public body, he were assured his annual income, "*plus* all prospective value "inherent in his investment." He believes this result is nearly always attained by the ordinary process of arbitration. This being so, the sooner any "false and pedantic "sentiment which stands in the way of transfer" is allowed to die out, and the matter is approached on purely business lines, the more likelihood is there that the agitation which has been going on more or less for the past thirty years over the Metropolitan Water Question will be set at rest. Should the municipalization of the water-works of London be one of the early prominent events of the Twentieth Century, the public must not be led away by the notion that their new undertaking will turn out to be a veritable gold mine. The price they will have to pay for it will be a big one, as Mr. Mansergh is careful to point out; and Lord Llandaff's Commission laid stress upon the fact that it would only be by the acquiring authority being allowed to dispense with payments to a sinking fund for the redemption of the purchase-money that the owner would be able, by maintaining the existing charges for water, to pay his way. This fact must not be lost sight of.

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 1224.)

THE Stock Exchange had a really busy and exciting time last week, such as it has not had for a long while. Too feverish and spasmodic, perhaps, to last; but still—there it was. The opening days were irregular and flattish; all eyes being turned to the West awaiting the result of the American Presidential Election. With the return of the "honest money" electorate, business opened in the street next morning soon after eight o'clock. The boom in the American market then started; and it lasted firmly to the close. Other departments profited to a degree sympathetically; but there was nothing like a uniform advance. Special circumstances existed in some quarters to keep things down. However, on the whole, prices for the week are higher. The Money Market was adverse to a general rise; for concurrently with the outburst of activity, rates hardened, and it was evident that lenders were on their guard, and were not disposed to facilitate reckless plunging. In the Gas Market, business was moderately active, perhaps a trifle more so than the preceding week, but that does not amount to saying much. The tendency, however, was not so good, being all in the direction of easier prices. Only three quotations were actually varied. But they were of important undertakings; and they were all lowered. In Gaslight issues, there was a fair amount of business done; and the ordinary held on tight to its old quotation. But the transactions recorded were all marked on the lower side of the middle figure, or no better than it. The secured issues were very quiet, but firm. South Metropolitan, which had been rather shaky, had to give way; and the closing mark was as low as 127. An unusual number of transactions were marked in Commercial; and prices ruled very steady. Business in the Suburban and Provincial group did not offer any feature of note; but British had a large fall just at the close—the quotation dropping a couple of points. The Continental Companies continued quite devoid of animation. Imperial was rather weaker, and fell a point; but the rest were steady. Nothing occurred among the remoter undertakings that calls for notice. The Water Companies have been more conspicuous; and several changes in value took place. The most noteworthy item is that Grand Junction is about to declare a dividend at the increased rate of 8 per cent. per annum.

The daily operations were: Transactions in Gas on the first four days of the week were moderate; and prices marked were fairly level, with perhaps just a perceptible tendency towards rather easier figures. But the quotations remained unchanged. In Water, however, Chelsea preference rose 2 on Monday, and Lambeth 1 on Tuesday; while New River fell 1 on Thursday. On Friday, transactions in Gas were lighter; but prices gave way. South Metropolitan receded 1½, and Imperial 1. In Water, Grand Junction rose 1½; but East London fell 2. Saturday was pretty active. In Gas, British fell 2. In Water, Chelsea rose 1.

ELECTRIC LIGHTING MEMORANDA.

The First Electric Power in Bulk Company—Nature of the Powers of Such Companies—Their Sliding-Scale—Comparison with Gas on the Power Basis—An Anecdote of Mr. Winston Churchill's.

THE first step was taken last week towards the carrying out of the powers granted by Parliament last session for the generation and supply of electricity in bulk, by the promotion of the Electrical Power Distribution Company. This venture came before the public with a share capital of £300,000, most of which was guaranteed by the Brush and allied interests. The directorate comprises such distinctive names as Raworth, Garcke, and Sellon. The object of the new combination, which is to be managed by Mr. W. L. Madgen, is to back up a number of electric power generation and supply ventures all over the kingdom. If the Company gets to work, it should soon settle the question of the commercial prospects of the idea of dealing with electricity in bulk. It is worth drawing our readers' attention to the peculiar sliding-scale arrangement that was enacted for all these schemes, and accepted by the same contingent of directing spirits for the County of Durham Act. This enactment has already been mentioned in our abstract of the Acts of 1900; but it should be kept in mind whenever any of the schemes to which it is applied is under discussion. Of course, the Press organs of aggressive Municipalism are proffering their condolences to the people of Durham on their ill-fortune in having their electricity supplied by a Company. They are assured that they will have to pay a great deal more for the service than if it had been municipal—blessed word!—in character; and so forth.

We shall not be suspected by anybody of holding a brief for the Garcke-Sellon combination if we undertake to show that in this particular case Parliament has only permitted them to undertake the business upon terms which beat any possible municipalism hollow, so far as the price of the service goes. Writers in newspapers and *quasi*-technical journals, whose cue it is to cry Municipalize! in and out of season, without knowing one scrap of the merits of any particular case, are bringing the cause they affect into ridicule and contempt. Take this County of Durham scheme as an example. Speaking generally, how can the supply of electricity in bulk to such a region be municipalized?

One might as well talk of municipalizing the North-Eastern Railway. If there is any advantage in this idea of dealing with electricity in bulk—as to which we suspend judgment—to invoke municipalism in regard to it would be to bar it from ever being realized. But see now, as a matter of fact, what this terrible Company have to do. Their statutory powers authorize them to "supply electrical energy in bulk to authorized undertakers." That is the extent of their right to exist. A man must be afflicted with municipalism on the brain to see any harm in that. But perhaps the authorized undertakers are companies too! That is so; but the districts affected must be supposed to know their own business. Newcastle and Gateshead, with about the cheapest gas and electricity supply in the kingdom, provided by Companies, have no quarrel with the principle of private enterprise in these lines.

Now as regards the price to be charged and the dividends allowed to the County of Durham Company, the Act practically concedes what was asked for in the Bill. Metered supplies are to be charged for at the rate of 4d. per unit for any quantity not exceeding the equivalent of 100 hours of supply at the maximum power demanded; falling to 2d. and 1d. per unit for supplies up to and exceeding 200 hours. How these supplies are going to be satisfactorily metered is another story, which need not be gone into now. To this schedule of prices the following condition is attached: The normal maximum dividend is 8 per cent., "Provided that in respect of any year during the whole of which the prices actually charged by the Company shall have been at the rate of 1¼ per cent. or more below the maximum prices stated . . . such dividend may be increased in the ratio of 5s. per cent. in respect of every complete 1¼ per cent. by which the prices so charged by the Company shall have been below such maximum prices. . . . If in any year the dividend paid by the Company for that year exceeds the aforesaid rate of 8 per cent., the prices to be charged by the Company for the next following year shall be 1¼ per cent. less than the maximum prices stated in the schedule to this Act in respect of every complete sum of 5s. per cent. by which the dividend so paid exceeds 8 per cent." After any period of ten years, both standard prices and sliding-scale may be revised by the Board of Trade.

That is sufficiently sweeping. Eight per cent. dividends are regarded as sufficient remuneration for the undertakers of this blind enterprise; and the sliding-scale is made operative over a couple of years. On the basis of power generation, a unit of electricity is equivalent to about 33 cubic feet of town's gas, in round numbers. It will be necessary therefore to get the average price per unit down to a penny or thereabouts before it will compare on level terms with the ruling gas prices of the district. It is not a very bright outlook for the new Company. And supposing that they get business enough to be able to earn their statutory 8 per cent. dividend, that is the smallest rate of return upon the whole investment which would enable a municipal undertaking to pay interest, sinking fund, and depreciation charges. It is therefore inconceivable how the consumers of electricity in the county of Durham could be better served than they must be by the help of this Company, if it is really to make a living.

An unintentional exposure of the weak point of electric arc open-air lighting is made by Mr. Winston Churchill, in his lectures descriptive of his South African experiences and adventures. He recounts how the first step of his successful escape from prison in Pretoria was made by climbing the fence "in the deep shadow cast by the electric light" from a tree. It is a very questionable recommendation of the light in question, for use where the provision of facilities of this kind is not intended.

THE PROSPECTS OF THE AMERICAN COAL EXPORT TRADE.

THOSE English students of political economy who cannot bring themselves to see that the exportation of British coal can ever injuriously react against the home consumer, may be counselled to take notice of the impression that the mere wind of a tentative exportation of American gas coal has already made upon coal consumers throughout the United States. Americans may know nothing about the canons of authoritative political economy, as these are understood in the United Kingdom. Their national tariff system, and their huge internal "trust" organization, may have obliterated from the American mind the very capacity for appreciating the principles of Free Trade; and in this case, American judgment of the potentialities of the creation of an export trade in coal may not be regarded by our classical economists as worth very much. But it cannot be denied that, individually and by industrial groups, Americans who are large consumers of coal look apprehensively on the prospect of the resources of their country being sold away from its shores. They are not afraid of any premature exhaustion of the bituminous coal capital of the continent, which is, indeed, too vast to feel the physical effect of any possible export demand; but they do dread the commercial result to themselves of even a moderate foreign coal trade.

This opinion is probably all wrong; but it is certainly widely held. American gas engineers who have visited Europe this year take the matter very seriously. It is a remarkable thing, to say the least of it, how little the practical man whose business requires him to buy coal largely, regards prophecies of an approaching dearness of the commodity by reason of the exhaustion of the most easily-worked beds, the greater cost of working those that remain, and similar topics of the lecture-room. These prognostications may be all true; but they do not touch the spot value of coal. While the theorists talk of coal costing a century hence another 5s. a ton to get from a depth of 1000 feet more than existing mines, the buyer has painful experience of the fact that the turn of the market will pinch him to that extent and more, without the faintest warning. This is the chief reason why the gas managers of two continents remain calm in spite of Jevons and his school, while fearing the power of their matter-of-fact friend the colliery agent.

The two latest numbers of the "Engineering Magazine" have afforded unmistakable evidence of the seriousness with which this question of coal exportation is taken in America. In October, the subject of the world's need of coal, and the ability of the United States to supply it in part, was discussed by Mr. F. E. Saward, an acknowledged coal trade expert. In introducing Mr. Saward's article, the English Editors of the magazine point out that Jevons took the exclusively national view of the basis of his sinister prophecy. He held that, with the exhaustion of native coal, the wealth and power of Britain would decline; but there is a broader view of the matter, which has been forcing itself into recognition more and more during the 35 years that have passed since Jevons prophesied. In this new light, purely local advantages sink into insignificance. The great storehouse of the world's resources is a common one: "The funds of material, of energy, even of human skill and handicraft, are in reality and inevitably a joint possession, which it is the duty and destiny of mankind to utilize and to distribute to the uttermost for the good of all. The New World, which supplied to the overburdened Old World first room and opportunity to labour, then bread and clothing, now opens to the underfed furnaces, mills, and workshops of Europe almost limitless stores of the coal and iron which are the prime material necessities of modern life. These will prove as life-giving and as little to be considered menaces to England's prosperity as were the wheat of the prairies or the cotton of the Southern States."

That is the sound, English view. We do not care where our supplies come from, so that we can buy in the cheapest market. On the other hand, if our natural productions, whether of coal or anything else, sell better elsewhere, there is no restriction upon their exportation. Still, as sensible observers, we are glad to see that the Editors of the "Engineering Magazine" welcome the prospect of the United States coal supply being able to assume a part of the export trade that has hitherto fallen so heavily upon British resources. We really do want all our coal for our own use, and should be very glad to see the Continental and Eastern demand supplied from elsewhere. It is impossible to persuade the home consumer that the at present heavy foreign demand does not raise the price against himself. There has been talk about imposing an export duty of 5s. per ton on British coal sent abroad; but it is only talk. Those who amuse themselves by raising the question of the probable effect of such an impost, know that the discussion is a purely academical one. The discrimination of the probable effect of the willingness of foreign buyers to pay almost any price for the good English coal, is, however, another and a far more profitable study. Can America, for example, do business with Europe in coal at ruling prices? That is the question of the hour, for the Continental coal trade.

For it is abundantly clear that, if any source of gas or other kinds of coal is to come to the support of Europe and the relief of the drain upon England, it must be the American. Germany, France, and Belgium cannot adequately feed the local demand from home-raised coal as it is; and the cry is always for more. And in addition, there are the countries bordering on the Mediterranean. The more these ancient lands rouse themselves to active life, the more coal they will want; and they have none of their own. Where is it to come from? Only from England and the United States. Whether the native consumers of American coal like it or not, the American colliery interest, like our own, must respond to the inducement of the high European value of good coal. The interest of Mr. Saward's article lies in the candour with which he sets out the prospects of American participation in this great and growing European import of coal. Bituminous coal, which alone counts in this connection, occurs throughout the States from the Atlantic to the Mississippi; the quality being best nearest the coast, and falling off as the beds extend to the westward. This geographical peculiarity is fortunate. Already there are coaling-stations for steam vessels on the Atlantic sea-board, as Newport News, whither ocean tramps resort for "bunkers," which is a sure indication that there is "good business" in this new supply.

The chief point made by Mr. Saward is that the bituminous coal-fields of the United States have as yet hardly been more than scratched. Whereas coal has always been high priced in England—originally by reason of the small demand for, and extravagantly costly ways of getting it, and now because the operations of winning and underground haulage are very expensive—in the United States it is as easy to get as clay. The present great and growing demand for American coal finds the deposits in the virgin state; and the collieries can open up the new ground straight off, with the newest and most economical plant and arrangements for saving material and labour. Generally speaking, there is not a coal mine in the seaboard bituminous fields from which the coal has to be hoisted. It is

quarried, and frequently at such levels that the loaded trucks run downhill. The railway companies serving this region some years ago studied the problems of coal transportation with the utmost care; and the result is seen to-day in the scientific arrangements for dealing with the coal traffic. The railways are very substantially made; and over them run trains of 50 trucks carrying 50-ton loads, with 10 per cent. excess weight, hauled by huge slow-steaming locomotives. Such a train moves 2700 tons to market at one trip.

The next factor making for cheapness is the increasing use of coal-cutting machines. The history of machine coal carbonizing in England has been repeated in the American bituminous coal-fields. So long as the colliers worked satisfactorily, the introduction of mechanical coal-cutters progressed slowly; but when labour troubles arose, the machinists had their chance, and took it. The conclusion of every strike saw more coal-cutting machines in use. Among other advantages, the machine does not spoil so much lump coal as the man. Thus there is plenty of bituminous coal on the Atlantic seaboard, and no difficulty about getting it to the tideway. Here, however, the obstacle of high freights has barred the export trade. The small coalowner has been at a disadvantage, in having to bid against other shippers for such freight as might happen to be going. This obstacle is only a temporary one, and will be overcome by a combination of coal shippers who will do as the Standard Oil Company did for oil—build their own fleet of carrying steamers. It has been determined that 7000-ton ships would be the most economical transatlantic coal carriers. They would steam at a speed of 10 knots, which is the cheapest rate for ocean tramps. This would mean a trip across the Atlantic and back accomplished every month.

Taking Gibraltar as the centre of this new trade, a careful estimate fixes the cost of carrying 7000 tons of coal across from the Atlantic States at a fraction over 80 c. per ton for the single trip. If the vessel returns light, so as to double the cost of carriage, it is then only $1·60, or well under 8s., per ton. This would enable the American producer to get a good price for his coal, and still compete with the English product anywhere in Southern Europe. Of course, it is doubtful how long the rates actually ruling for English coal can be maintained. At bottom prices, Cardiff and the Tyne would still be hard to beat in European ports. The lack of return cargoes would seriously handicap a transatlantic collier fleet. For the present, such a fleet is purely hypothetical. No such ships exist, nor can any American shipyard build them; and there are no docks over there to take them in. Consequently, it must be agreed that Mr. Saward's fancy of a great addition to the American mercantile marine, capable of carrying native coal abroad as the English ships do, is somewhat telescopic in its range.

In the November number of the "Engineering Magazine," Mr. F. Seaton Snowdon descants upon the actual facts of the export coal trade of the United Kingdom, which last year accounted for 41,180,300 tons, valued at £23,105,691, besides 12,250,000 tons sent out as "bunkers." Against this, the American exportation was 5,750,000 tons, valued at £3,145,000, apparently inclusive of "bunkers." Thus the United States has a good deal of leeway to make up. British steam colliers, moreover, have for some time been all that Mr. Saward's fancy pictures as coming within the bounds of possibility for American keels, and more. For, following Professor Biles, Mr. Snowdon awards the palm for cheap carriage to a 9000-ton craft, which, running 267 miles per day, has actually transported herself and cargo with a coal consumption of 0·036 lb. per mile. A ton of shipping and freight driven a mile by a little over half-an-ounce of coal! Various coal-handling plants are mentioned by Mr. Snowdon. He puts the advent of American coal into Europe upon the willingness of those interested in the trade to build ocean colliers upon a sufficiently large scale. If this forecast is reliable, then the result is merely a question of time. In the long vistas of history, it is not so much where a nation or an industry is at a particular date that matters, as the direction in which it is travelling and the nature of the forces impelling it. Judged in this way, the future of the American coal export trade would appear to be bright, in respect of many foreign markets which are now served from England.

In the "JOURNAL" for the 30th ult., reference was made to the approaching home-coming of Corporal Douglas F. Colson, son of Mr. Alfred Colson, of Leicester, who, as may be remembered, has been serving in South Africa with the Electrical Engineers (R.E.) Volunteer Corps. What promised to be a career of great usefulness was cut short by blood poisoning; and Corporal Colson was invalided. He arrived at Southampton in the *Nubia* last Tuesday morning, and, accompanied by his father and brother, reached Leicester in the evening. A large number of the officials, as well as representative workmen of the Gas and Electric Lighting Department, met him at the Midland Station, and gave three hearty cheers as the train drew up, and escorted him to a carriage and pair, decked with the national colours, in which he drove off to his father's residence. There the band of the department was stationed in the garden, and greeted the party with "Home, Sweet Home," "Soldiers of the Queen," &c. Corporal Colson, who was much touched by the kindly greetings, looked remarkably well; but it was noticed that he carried his right hand in a sling.

SIR ROBERT GIFFEN ON THE TRADE OUTLOOK.

THE prices of so many of the materials, both raw and manufactured, which are used upon a gas-works, and especially of coal, so very largely depend upon the general condition of the Nation's trade that it is essential—though this necessity is not always appreciated as it should be—that those responsible for the management of gas undertakings should possess a sufficiently intimate acquaintance with the trend of business to enable them not merely to gauge at any time the state of the markets, but to exercise an "intelligent anticipation of events." The first, though sometimes difficult, is at all times a much easier task than the second. Both were essayed by Sir Robert Giffen (whose authority to deal with the subject is unquestionable) in an address delivered at a private meeting in July last, and published in the current number of "The Economic Journal," the organ of the British Economic Association. That address, which is entitled "Our Trade Prosperity and the Outlook," affords most instructive reading, and provides a valuable analysis of the present situation, as well as assistance in shaping a forecast of the future. We can only here do scant justice to its contents.

To bring home to his hearers the extent of the trade revival witnessed during the past two years, and especially during the twelve months ended last June, Sir Robert gave some statistics which, properly appreciated, together may be said to constitute a trade barometer. One of the best tests of the general course of business is to be found in the returns of railway traffic, which are indicative of the volume, as apart from the value, of trade. These returns show an increase of business from 72·8 millions sterling in 1888 to 96·2 millions in 1898, and no less than 101·6 millions last year. The returns for the early months of this year also record an increase, but not by any means at so rapid a rate—on an average only about 2 per cent. for the June half year; and the tendency is for the increase to disappear altogether.

The movements of shipping in the foreign trade afford another test of prosperity; and here the same abnormal activity has been observed during the past year. The clearances with cargoes from the United Kingdom rose from 31·6 million tons in 1888 to 39·5 million tons in 1898, and 43·1 million tons in 1899; the last year showing an increase nearly five times as great as the average increment for the preceding ten years. The consumption of coal—a sure indicator of the state of trade—rose from 170 million tons in 1888 to 202 millions in 1898 (an average increase of 3·2 millions per annum), and to 220 millions last year. That is to say, the output in 1899 was greater than that in 1898 by 18 million tons, an increase almost six times larger than the average growth of production in the ten years from 1888 onwards. This year will probably see a still further expansion of output to something like 235 million tons.

The foreign trade of the country also enormously developed last year, and has gone on expanding until quite recently. The figures concerning imports and exports must not, however, always be accepted as by themselves constituting conclusive evidence as to trade prosperity or the reverse. If, for instance, we obtain 10 millions more for a certain quantity of goods exported in one year than in the preceding, but have to pay 12 millions more for the raw material imported out of which those goods are manufactured, the fact that the value of our dealings with other countries had increased 22 millions sterling could not be taken as an indication of growing prosperity; for it is obvious that we should have made 2 millions less profit in the second year than in the first. A proof of the caution with which the *value* of our commerce with other nations should be taken as a guide to the state of trade is afforded by the Board of Trade returns for September last. The value of the principal exports during that month was £12,081,000, as compared with £10,910,000 in September, 1899, or an increase of £1,171,000. If, however, the quantities exported this year be valued out at the prices of last year, this increase would disappear, and a decrease of no less than £1,447,000 be shown. Anyone, therefore, wishing to judge of the actual state of our foreign trade must observe quantities as well as values, and consider also the relation of the imports to the exports. Last year both quantities and values rose very much—the latter, however, more than the former. Our imports cost us 15 millions more than in 1898; but we obtained 22 millions more for our exports. It may then be said that we did a larger and more profitable trade with other nations than in any former year.

For this fact the extraordinary demand for coal was largely responsible, as, of the net gain of 7 millions of the increase of export over import values, no less than 5 millions were due to the coal shipments, which rose in value from 18 millions in 1898 to 23 milions in 1899. This enormous and continued development of our foreign coal trade is naturally the subject of much comment by Sir R. Giffen. It may be said, he remarks, "that in the present year we are exporting about 45 million tons of coal at a value of not less than 37 millions sterling; whereas, in 1888, the export was 27 million tons, at a value of 11·3 millions sterling only. The increase in quantity is two-thirds of the former amount, but the increase in value is [more than] twice the total amount exported in 1888, or an increase of over 23 [25] millions sterling in this one article alone, so great is the change in a very few years." The expansion of the national revenue, unless due

to heavier taxation, is proof of greater prosperity. Here, again, the witness to the recent industrial revival is beyond question; the increase, which during the ten years ended March 31, 1899, was at double the rate of the growth of population, being in the twelve months from that date no less than 10 per cent.—namely, from 108·3 to 119·8 millions. Allowing for the heavy sums paid in duty at the close of the financial year, in anticipation of the Budget, the real increase may be put at something over 7 per cent. The annual growth of population is about 1·1 per cent. In this connection, the striking growth in the assessments to income-tax may be observed; the rise in ten years being from 592 to 729 millions sterling.

By whatever means we test the material well-being of the Nation during the past year or so, and especially during the first few months of this present year, it will be seen we get the same answer—that the times have been of abounding prosperity. The question of much importance is: What are the prospects of this great prosperity continuing? The answer to this question is, as already remarked, of serious consequence to the gas industry. No one in the industry wishes to see his country anything but prosperous; what every such one does, however, desire is that trade would be constant in its progress, instead of violently spasmodic. It is the sudden upleap of demand, outstripping production by a wide gap, that so dislocates business, and especially that of gas making, because the demand for coal is one of the first to grow with an expansion of trade. What everyone wants to know, therefore, is: Has the recent spurt of trade spent itself; if not, when will the abatement come?

Speaking, be it remembered, last July, Sir Robert Giffen declared—and the time that has since elapsed has served merely to endorse his opinion—that business had received a check "which is concealed in some of the usual statistics by the rise in values." This, it is pointed out, as we ourselves have repeated constantly, was bound to follow from the great increase in the prices of coal and iron. The direct effect of this upon trade "is well illustrated by what is happening in gas, an article closely dependent upon the price of coal. The gas companies, enjoying a monopoly, are able to recoup themselves in part by charging more to the consumer. [Whose trade, if he be engaged in business, suffers in consequence.] But other manufacturers are in a different position. Railway companies, for instance, are unable, for various reasons, to advance their charges; and shareholders have to submit to an immediate loss of dividend. Such a loss of profit, when diffused throughout trade generally, diminishes enterprise, and trade is also indirectly affected by the diminution of the accumulation which capitalists are able to make. Whatever may be the exact explanation, it can certainly be affirmed that a rise in coal and iron such as has now taken place is invariably followed at no very long interval by slackness in general trade."

Other factors working towards an easing down of the rate of commercial expansion are the stringency of the Money Market—the continuance of the Bank Rate at 4 per cent., or over, contrasts strongly with the long spell of a 2 per cent. rate when trade was at its lowest ebb—and the very sensible rise in wheat. Dear food is, *pro tanto*, unfavourable to industrial prosperity, and dear capital inevitably so. The prevailing political unrest in many parts of the world, moreover, tends to discourage enterprise; "the assurance of peace is needed for undertakings requiring a long period to carry through." The effects of increasing foreign competition must also be to bring down prices; but we must leave till another occasion any comment upon Sir Robert's views on that side of the question.

The signs, in July last, according to so skilled an observer as Sir Robert Giffen, were, then, that slack water had been reached. Since this date the tide has certainly begun to ebb; and for gas companies a waiting policy is undoubtedly the wisest. To quote Sir Robert's concluding remarks, "the lesson to all business men is, of course, the need for caution. Heavy commitments in proportion to resources, and undertakings extending over long periods, which are things rather to be avoided at the best of times, unless under special circumstances, are now to be most carefully eschewed. The trade barometer must return to 'set-fair' before speculation like that of the last few years can again be entered upon." Gas management does not at any time lend itself to "speculation" in the commonly accepted meaning of the word; but the warning to avoid "undertakings extending over long periods" is one that should be taken seriously to heart by those responsible for the conduct of gas undertakings. Three-year contracts for coal at 13s. 6d. f.o.b. Tyne, are certainly examples not to be flattered by imitation.

ANNUAL REPORT OF THE HOME OFFICE ON THE OUTPUT, CONSUMPTION, AND EXPORTS OF COAL.

In the leisurely manner that characterizes the actions of our Departments of State, Parts I., II., and III. of the Home Office report and statistics relating to Mines and Quarries for the year 1899 have made their appearance. Part III., which gives full details of the output, consumption, and shipments of minerals, and is the section of most interest to our readers, has only just been published, and we now propose to make such extracts as contain information valuable for purposes of reference to those whose business it is to understand the coal market, and all the factors that have influence upon it. We may here take the opportunity to say that in every gas company of any magnitude it should be the special duty of some official of proved intelligence (preferably, of course, the manager) to acquaint himself, week in week out, with all the information concerning the coal trade that can be gleaned from all and sundry sources. Coal buying is one of the most important transactions a manager or a board has to carry through, and should be the subject of everlasting vigilance, especially at such a time as the present. We are no believers in cast-iron methods of buying coal—buying, that is to say, always at the same time of year and for the same period. It is policy at times to buy a few months' requirements only; at others to buy for as long a period as it is possible to obtain contracts for from reliable firms. The returns before us illustrate our point.

The average price of all kinds of coal at the port of Newcastle has ranged from 7s. to 20s. 5d. per ton during the past 27 years; being at the highest price in the first of those years—namely, 1873. The price in the five following years averaged 16s. 11d., 13s. 2d., 10s. 9d., 9s. 9d., and 8s. 7d. per ton. During that period, the buyer who made the shortest contracts made the most profit. In no one of the next ten years (1879-88) did the price rise above 7s. 11d., or fall below 7s. It would, obviously, have been perfectly safe to have made as long contracts as could be negotiated throughout this period; the justification for such a policy being that the price might rise considerably, but could not, in the nature of things, materially fall. As a matter of fact, it did eventually rise; the price averaging 7s., 8s. 4d., 11s. 5d., and 10s. 4d. per ton in the years 1888-91. The buyer who closed a long contract at (say) 7s. 3d. in 1888—conceding 3d. a ton to gain his object—would have done a good stroke for his concern; and, even had the price not risen as it did, he could not have gone far wrong.

From 10s. 4d. in 1891, the price dwindled away steadily, till it got down to bottom again; averaging 7s. 2d. in 1896, and 7s. 4d. in 1897. Since then it has steadily mounted up once more; and the man who at the end of 1897 should have had the pluck and foresight to buy three years' consumption at 8s. would have had a happy time this past twelve months. The moral of all these figures—the point at which we are aiming—is that there is a certain level below which there is no possibility of a material fall, but above which there is an absolute certainty of a considerable rise in the course of time. It is the gas manager's business to know that level (which will vary slightly from one period to another, from labour and other causes); to buy all he can when it is reached; to recognize the approach, and to gauge the probable duration, of a period of rising prices; and to regulate the length of his contracts accordingly. Personally, unless driven to it, we would not, from now onwards, buy more than a few months' requirements at a time until the prices of 1895-97 were once more in view, unless the signs of the times so altered as to make it clear that trade was reviving so rapidly and healthily as to threaten again to overtake with its demands the output of coal.

Such a policy of expediency, whatever else be thought of it, must be admitted to call for the detailed knowledge and constant vigilance which we began by declaring as essential to successful bargaining in the coal market. Believing in that policy, and recognizing the need of complete information to its successful pursuit, pains have been taken during the past months to record in these columns, as we hope in future to record, such facts as it has been thought would prove of value, now or in times to come, to our readers. From this lengthy preface, we pass to the consideration of the Home Office report.

In his introduction to the report, Mr. C. Le Neve Foster, the Editor, remarks that the most striking fact recorded in the mineral statistics for 1899 is the enormous output of coal—viz., 220,094,781 tons, showing an increase of 18,040,265 tons compared with the previous year. This country is now producing twice as much coal as it did in 1870, and probably nearly four times as much as in 1850. Durham and Yorkshire together are now yielding about as much coal as the output of the whole of the United Kingdom half a century ago. The following table summarizes and compares the figures for 1898 and 1899 in groups of coal-fields.

Name of Coalfield.	Coal Raised. Millions of Tons. 1898.	1899.	Average Price at Pit's Mouth. 1898.	1899.
Scotch	30·24	31·14	6s. 1d.	7s. 6d.
Northern	45·31	46·05	5 11	7 0
Yorkshire, &c.	46·97	49·72	6 6	7 5
Lancashire and Cheshire	25·03	25·11	6 5	7 6
Midland	19·79	20·25	6 2	6 11
Sundry small fields	4·65	4·62	6 10	8 10
North Wales	3·20	3·20	6 9	7 9
South Wales	26·72	39·87	7 1	8 10
Irish	·13	·13	8 1	8 2
Total	202·04	220·09	6s. 4·22d.	7s. 7·03d

The most striking increase, it will be seen, took place in the South Wales coal-fields. But it should be noted that the output there was seriously affected by the strike in 1898; so that 9·08 million tons of the 13·15 millions increase last year was required to bring the output up from the 1898 to the 1897 figure. But for the labour trouble in Wales, the increase of 18 million tons in the quantity raised last year, as compared with either of the two preceding years, would have been spread about equally over 1898 and 1899. The increase in the average price at the pit's mouth last year, of

1s. 3d. per ton may seem surprisingly small; but it should be remembered that the great upward movement in the market did not take place until the latter part of 1899. Small as that increase appears compared with the rise that has since taken place, it may be noted that it represented a sum of no less than 13¾ millions in the cost of the year's output. As Mr. Foster says in his report, "with our present output, a rise of one penny in the price of coal represents nearly one million of money."

With the exception of a small quantity from the Oolite in Scotland, all the coal was obtained from rocks belonging to the Carboniferous Epoch, and mainly from the true coal measures. In the North of England and Scotland, some of the coal seams are geologically older; occurring in strata of the same age as the millstone grit and carboniferous limestone. Some of the coal in Scotland is of still earlier date; being found in the calciferous sandstone at the base of the carboniferous rocks. Owing to the rise in prices this year, this coal is now being re-worked. The thickness of the seams worked varied from 11 or 12 inches to 30 feet; but the "ten-yard" coal of Staffordshire is quite exceptional. In Scotland, seams of cannel only 6 inches in thickness have been worked.

The quantity of coal exported last year (including 12¼ million tons shipped for use in steamers engaged in foreign trade) was 55,810,024 tons; leaving to be consumed for all purposes in this country 164,284,757 tons—equal to a consumption of 4·05 tons per head of population. The highest *per capita* consumption of coal previously recorded was 3·87 tons in 1897. In the year 1873, when the last coal "famine" was experienced, the figure was only 3·5 tons per head.

This increase, both of output and of home consumption, in Mr. Le Neve Foster's opinion, proves the urgency which the question of the exhaustion of the coal supply is rapidly assuming; and he calls attention to the practical importance of checking its thriftless use. As Professor Perry pointed out to the British Association this year, the best steam-engines are utilizing only one-twelfth of the energy generated by the combustion of the fuel, while ordinary steam-engines utilize a far less proportion. "Whether," says Mr. Foster, "our coal supply is sufficient to last for some centuries, or whether, as is the opinion of many competent authorities, a serious coal famine will begin to be felt within the lives of the present generation, economy in the use of coal is unquestionably of the utmost importance; and the investigation of the best means of effecting such economy would repay even a large expenditure, whether by the Government or by industrial corporations and technical societies. If the result of such inquiry were merely to effect an economy of 1 per cent. in the consumption of coal, this would mean an annual saving to the coal consumers of this country of 1¾ million tons, worth, at last year's prices, about £625,000."

Such an investigation would naturally cover the question of the supply of coal for the Navy; the efforts of the investigators being aimed at discovering some method of burning ordinary coal without the production of smoke or the loss of speed. Our ships would then no longer be dependent upon one class of fuel; the naval coal bills would be lessened; and the danger of the failure of the fuel available for naval purposes would arise only when the total coal supply of the country approached the point of exhaustion.

The Home Office Inspectors of Mines join, it will be seen, in the cry that arose some months ago, but is at present no longer heard, for the appointment of a new Coal Commission. This would, as we have before said, be a wise and useful step; but its results would not be available for a long time to come. There is one, however, that could be taken which would be of immediate benefit, and which would be of great value to the public. That is the obtaining and publication of monthly output returns from the various coal-fields. We get the export statistics within a week after the close of each month; the outputs not until three quarters of the next year have expired. We commend the suggestion to the Home Office. They should not let themselves be beaten by the Board of Trade.

PERSONAL.

Mr. W. H. Reed, who has for the past six years filled the position of Assistant to Mr. F. C. Cockey, Assoc.M.Inst.C.E., at the Newport (I.W.) Gas-Works, has been appointed Manager of the Whitchurch and District (Hants) Gas Company, Limited.

With reference to the advertisement which recently appeared in the "Journal" for a Secretary for the Hornsey Gas Company, we are informed that Mr. William E. Roberts, from the Accountant's office of the Eastbourne Gas Company, has obtained the appointment.

Last week Mr. W. Ewing and Mrs. Ewing were each presented by the men employed in the Hamilton Gas-Works with a gold-mounted ivory-handled umbrella. Mr. Ewing, in accepting the gifts, thanked the workmen sincerely for them, and said that no corporation had better or more earnest workmen than Hamilton. He was proud to have been associated with men who had so ably done their duty; the Hamilton Gas-Works being second to none in the country, for economical working.

Mr. S. W. Durkin, youngest son of Mr. S. W. Durkin, of Southampton, has been appointed one of the Assistant-Engineers of the Australian Gaslight Company, Sydney, N.S.W. He was articled to his father, and holds certificates from the Hartley Institution at Southampton, as well as from the City and Guilds of London Institute; and he studied gas chemistry under Mr. Norton H. Humphrys, of Salisbury. He was appointed Junior Assistant at the Southampton Gas-Works at the latter part of 1899; but the Directors very kindly released him from the position last Wednesday, with good wishes for his success, accompanied by an acceptable present. He will leave for his destination on the 23rd inst., under a three years' agreement, and with the united good wishes of all who know him.

The members of the Hollinwood section of the gas workers in the employ of the Oldham Corporation recently had a pleasant gathering, at which about 300 were present, to testify their esteem for Mr. John Lowe, who, on account of impaired health, has resigned the position of Resident Manager at the Hollinwood Gas-Works, which he has held for 26 years. Unfortunately, he was too ill to attend. In the course of the proceedings after tea, Mr. John Chadwick, the Corporation Gas Engineer, presented to Mr. Herbert Lowe, for his father and mother, a testimonial, which had been subscribed for by the employees, consisting of a marble timepiece and two large bronze ornaments for Mr. Lowe, and flower and toilet stands for Mrs. Lowe. He testified to the faithfulness of the service rendered by Mr. Lowe, and expressed his pleasure at the esteem shown for him by those with whom he had laboured. Mr. Lowe, jun., returned thanks for the gifts, and for the sympathy shown towards his father, who, he said, had been in the service of the Corporation for forty years.

Mr. E. Antony Lees, the Secretary of the Birmingham Corporation Water Department, is a candidate for the Secretaryship of the Gas Department, which will be vacated by its present worthy occupant, Mr. Edwin Smith, in March next year. The Water Committee are desirous of retaining the services of Mr. Lees, who has made himself a thorough master of the work attaching to his appointment and the department generally. The Committee have been looking round; and they have come to the conclusion that the duties of the office are quite as onerous, responsible, and important as are those of the Gas Secretaryship. They also find that, for corresponding positions in water undertakings of similar eminence, higher salaries are paid than Mr. Lees has been receiving; and consequently they hastened to rectify the matter last Friday by proposing to the City Council that Mr. Lees' remuneration should be increased, by £200, to £1000 per annum—the salary at which the Gas Committee are advertising the vacancy in their department. Of course, there were objectors to the proposal; but they were few—the voting showing 41 in favour, and only 7 against.

OBITUARY.

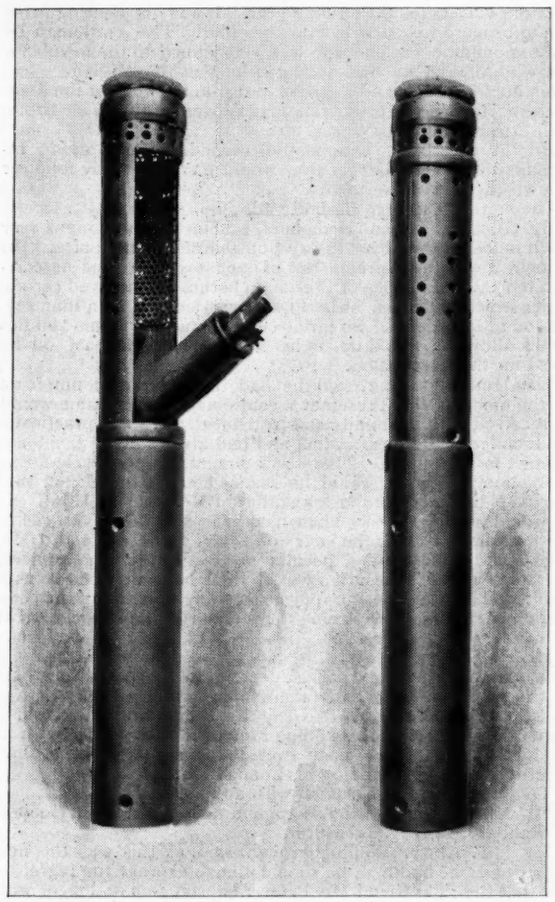
We record with sincere sorrow the death of Mr. Essex White Layton, after a long and painful illness. Deceased (who was 60 years of age) had filled the office of Secretary to the Buenos Ayres (New) Gas Company, Limited, for a period of 25 years, and was held in high esteem by a wide circle of friends for his ever courteous and genial manner. He was buried at Kensal Green last Friday.

We sincerely regret to record the death, yesterday morning, of Mr. T. W. R. White, the Secretary and Manager of the Sherborne (Dorset) Gas Company—a position he had held for many years. Mr. White was identified with the formation of the South-West of England Association of Gas Managers, of which he was at one time Hon. Secretary. He was twice chosen for its President; the last occasion being in 1896, when he welcomed his colleagues to Sherborne for the third time. He was the last to occupy the presidential chair, as the Association shortly afterwards amalgamated with the Southern District—Mr. White remaining a member. He joined the British Association of Gas Managers in 1868, and was upon the roll of the Gas Institute till his death. The sad event which we briefly record removes one whose kindly disposition endeared him to all with whom he was associated; and general regret will be felt by his professional brethren and fellow-townsmen at his removal from among them. The funeral will take place at Sherborne to-morrow, at three o'clock.

It is with great regret that we announce the death of Mr. Augustus George Hounsham, the Secretary of the Monte Video Gas Company, which took place at his residence, Heathside, Hampstead, last Friday, in his 58th year. Mr. Hounsham was the Accountant of the London Gas Company, but relinquished the position, with a retiring allowance, on the absorption of the undertaking by the Gaslight and Coke Company in 1883. Though relieved at a comparatively early age from close attention to official duties, he possessed far too energetic a temperament to allow him to fritter away his time in idleness. Consequently, in 1890 he undertook the secretarial work in connection with the Livesey Testimonial Fund and with the formation of the Institution of Gas Engineers, which organization he had the gratification of seeing fairly started. About this time, however, he obtained the appointment of Secretary of the Monte Video Gas Company, Limited, which required the whole of his attention; and he was compelled to relinquish the position. Mr. Hounsham was one of the Auditors of the Commercial Gas Company, the Crystal Palace District Gas Company, and of other Companies. He was often seen at meetings; and his familiar face and vivacious manner will be greatly missed.

THE FOULGER-GLOVER LAMPLIGHTERS' TORCH.

PERFECTION, as everybody knows, is compacted of trifles. In the long and arduous struggle of the incandescent system of gas lighting against difficulties of detail, it was rightly regarded as a milestone on the road to success when the system was advanced to the hazardous eminence of the ordinary public street-lamp. This promotion forthwith evoked new difficulties, of a character totally different from those which had been met and overcome in respect of interior lighting; and some of them continue to occupy the attention of the ingenious. One of the troubles encountered on the threshold of this application of the system was that of ignition. The most obvious expedient available for attacking this problem, and the one which was promptly pressed into the service, was the flash-light. It is unnecessary to recount the various ways by which this familiar device was adapted to the lighting of incandescent street-lamps. They all had certain features in common. First, there was the flash-light itself, which did its duty when it was consuming gas at the rate of about one-third of a cubic foot per hour throughout the hours of non-lighting. This was a vexatious expense, and one that no engineer ever really forgave himself for sanctioning. It was not only a waste of gas rendered necessary by sheer lack of knowing how to dispense with it, but it involved other expenses. The lantern-cock



had to be of an expensive make; and it was a complicated business to provide for the steady maintenance of the flash-light all day, to ensure that it should light the burner when turned on, then go out during the hours of lighting, ultimately to light itself at the burner when the latter was turned off again. After all, the flash-light was an unprofitable servant. It did not improve the mantle, to say the least of it; and if the lantern happened to be leaky and the weather was rough, as often as not the light was out when the lamplighter went his rounds. It always wanted air—which also means dust, and in rural localities insects; and it perished if there was too much of it. Whenever there was an "outage" of this order, several things might happen. The lamp had to be left until the lamplighter had completed his round, when he would have to return with a ladder and light the burner by hand. This was not always a well-managed performance in a gale of wind, and not infrequently entailed the replacement of a mantle—itself not an easy performance in the dark, with wet, cold hands. The ordinary torch is not a handy implement for lighting an atmospheric burner, even if it can be brought into position immediately over it.

Painful experience of troubles of this kind, led Mr. G. F. L. Foulger, Distributing Engineer to the Gaslight and Coke Company, to scheme a modified pattern of torch for igniting a street-lamp incandescent burner directly, thus dispensing with the flash-light and all its consequential complications. It appears, at the first glance, a simple mechanical problem to solve; but, as a matter of fact, it is surrounded by such a mass of detail that the solution has been delayed until the present hour. A complete triumph, however, appears at length to have been achieved; and now half-a-dozen licensees are ready to put upon the market the perfected Foulger-Glover torch, for lighting all descriptions of street-lamps, illustrated herewith in its two working positions. One object of the designers was to avoid plaguing the lamplighter with any new-fangled appliance requiring any special study or carefulness in properly using. Therefore, the torch is firstly an ordinary article of the kind, with a colza 'oil-lamp in a straight perforated head. In this state it can be used for lighting a luminous-flame burner, just like another. The incandescent street-lamp, however, is modified for torch lighting. To begin with, the cock is simplified to the common lever article, to be manipulated by a push with the end of the torch. Next, the lantern itself is provided, in the bottom, with a round hole slightly larger than the head of the torch, and usually closed by the gravity action of a ball of suitable diameter. When he has turned on the gas, the lamplighter pushes the torch up through this hole until its head (which is finished by an asbestos-cloth washer) touches the reflector in the top of the lantern. Then he pulls a trigger ready to his hand, which communicates with a sliding part of the torch-head, drawing it downwards and releasing the lighted lamp, which pops outward by the impulse of a weak spring, and instantly commands the burner, over the mantle. As soon as the gas is lighted, the reverse action restores the lamp to its vertical position in the torch-head and returns the shutter. It is then a plain, straight torch once more. On withdrawal, the ball runs down a guide and closes the lantern.

One of the incidental advantages claimed for this system of torch ignition is the superior cleanliness of the lantern inside. Being made quite tight at the bottom, dust can be kept out, and is therefore not stuck hard to the glass, as usual, by the condensed water resulting from the first lighting-up of the gas in cold weather. There is also, of course, a considerable practical advantage in having only one pattern and kind of lamp-lighting device in use by the men. We have experimented with the Foulger-Glover torch, and can testify to its efficacy, and harmlessness so far as risk of breaking anything is concerned, even in the least expert hands. A considerable degree of unfair usage does not put it wrong.

The chief recommendation of the principle of abolishing the flash-light, of which this appliance is the embodiment, is the saving of gas. The amount of this can be readily computed. In London, where the gas for public lighting is not high-priced, the saving under this head will amount to £16 or £18 per annum upon the number of street-lamps comprised within every lamplighter's round—assuming that they are all incandescents. This is a substantial sum to work upon; and Messrs. Foulger and Thomas Glover are to be congratulated on the apparently complete success of their endeavour to save it, and to simplify generally the service of public incandescent street lighting. This is one more step towards the attainment of perfection in this service, which is a result well worth straining after.

NOTES.

Cheap Labourers' Dwellings in Birmingham.

It is claimed for the Corporation of Birmingham that they have probably attained the "bottom cost" of labourers' dwellings of the particular class aimed at by the provisions of the Housing of the Working Classes Act, 1890. The dwellings are in Milk Street; and, calculated upon the basis of living rooms only, the cost works out at something like £62 per room. But if the sculleries, &c., are included, the cost is reduced to £45 per room inclusive. These labourers' cottages have replaced some of the most insanitary house property in the city. They are distinguished from what are called artizans' dwellings. Unlike the usual "model" industrial buildings, they are only one storey high above the ground-floor; so that the inmates are not "mast-headed." Each floor, or flat, is self-contained, with living-room, one or two bed-rooms, and the necessary offices on the same level. The rooms are of decent dimensions. The upper storey has a balcony, and its own dust-shoot. At the back is a paved space 30 feet wide, which can be used as a playground or otherwise. Good grates and ovens are provided in every house; and the necessary fittings have been put in so that automatic gas-meters may be used by the tenants. The rents average 1s. 6d. per room per week. Mr. J. Tart, of the Corporation Estates Department, was Architect of the settlement.

Improved Domestic Hot-Water Plumbing.

Some criticism has appeared in the "JOURNAL" with regard to the stagnation of domestic hot-water plumbing practice. It is interesting, therefore, to notice that at a recent meeting of the Institution of Heating and Ventilating Engineers a paper by Mr. Thomas Potterton, of Balham, on the subject of "Range Boilers," was read and discussed. The paper described the ordinary arrangements for procuring a supply and circulation of hot water from kitchen ranges; and proposed an improved form of boiler constructed to better utilize the heat of the fire. The paper is reported in full in the "Ironmonger" for the 3rd inst. With the improved boiler, a large supply of hot water can

be obtained in excess of the domestic wants; and this surplus can be used for general warming purposes throughout the house. A diagram is given of a house near the Crystal Palace fitted in this way; and 200 feet of heat-radiating surface are stated to have been actuated here from the kitchen fire for several years. Other examples of the successful application of the system are cited. Radiators and towel-airers in bath-rooms seem to heat well, on the ordinary hot-water flow pipes. In the discussion, some exception was taken to the idea of joining a heating system to an ordinary household hot-water supply; but the objection did not appear to have any solid foundation. Mr. Potterton was able to point to examples of installations running for six and seven years with complete satisfaction to the users.

Keeping Red-Lead Paint and Putty Moist.

The paint and oil expert of the "Ironmonger" lately gave his readers two useful "wrinkles" for shop use. The first referred to the keeping of red-lead paint after mixing, which in the ordinary way is impossible, inasmuch as the mixture of red-lead and linseed oil sets as hard as stone in a few hours. If, however, about one-sixteenth of the quantity of lamp-black is added to the red-lead at the time of mixing, or soon after, the drying of the mixture will be arrested, and the stuff will keep in useful condition in the paint pot for at least a month. This expedient may be useful to remember in cases when a much larger quantity of red-lead paint has been prepared than happens to be wanted. The remainder can thus be put on one side, whereas, in the ordinary course, it would be wasted. The other hint relates to soft putty. As a general rule, glaziers' putty is required to set hard with exposure to the atmosphere; and for this reason it is made with a drying oil. But it is often the case that a non-setting putty is required; and this can be made with white-lead and tallow. The best preparation is 2 gallons of linseed oil, to which is added 1 lb. of pure tallow, and then sufficient white lead added to give the required consistency. This is a putty which will remain soft for ever. When it is necessary to loosen old glaziers' putty from glazed frames, it should be first gone over with nitric acid, which will enable the putty to be scraped away in about an hour after the application.

The Composition of Old Roman Mortar.

An interesting analysis and description of a sample of mortar taken from a part of the old Roman wall of London recently uncovered in the Old Bailey, has been given in the "Builder," which has always paid great attention to the composition of the strong mortars for which the ancients were so renowned. The analyses indicate that the proportion by weight of the lime to sand used by the Romans in manufacturing the mortar for the London Wall was about 1 to 4. The conversion of parts by weight into parts by the volume in a case of this description is largely a matter of guesswork; but taking the weight of a cubic foot of stone lime in the lump at 55 lbs., and that of a cubic foot of Thames sand at 103 lbs., then the measured proportion of lime to sand becomes about 1 to 2. Chemically considered, the mortar is good, because (1) the proportion of lime to sand by volume is about 1 to 2; (2) the proportion of silica soluble in sodium hydrate is high; and (3) the proportion of clay and organic matter present is very small. There is, however, nothing mysterious about this Roman mortar. Just as good lime mortar is made to-day, if not better; and we possess in fine-grade portland cement a cementing material much better than anything with which the ancients were acquainted. The Roman mortar in question was made with unscreened river sand, containing many pebbles; and it had been thoroughly mixed, being devoid of those small isolated lumps of lime or lime carbonate which are a result of faulty mixing.

Hints on Lighting.

In the "Student's Column" of the "Builder," some sound advice has lately been given on the subject of artificial lighting. Two principal rules are laid down, and their importance insisted upon. The first rule is that the light should be as diffused as possible; and the second is that the best use should always be made of reflecting surfaces. The pity is that, when architectural students become full-fledged architects, they forget all this salutary teaching. Speaking of the light of the electric arc, the writer remarks that the eye judges the intensity of an illumination, not only by the intrinsic brilliancy of the source of light, but also by the number of rays falling on the retina. Hence anything that causes the iris to contract and cut out some of the rays that would otherwise reach the retina, detracts from the illumination. Similarly, anything that makes the light more diffused and pleasanter to the eye increases the illumination. Thus bright naked lights, like the electric arc, are to be avoided. Diffusing globes must be used, notwithstanding the apparent loss of light entailed. For, it is argued, although the globe of an arc lamp may absorb 30 per cent. of the light generated, "yet if the effect of putting it on is to make the diameter of the iris expand 20 per cent., and so increase the area of the pupil of the eye by 40 per cent., then the effect of putting on the globe is to increase the apparent illumination." The value of reflecting surfaces is demonstrated by putting a piece of white paper behind the light source, which more than doubles the light radiation normal to its surface. The writer praises the "Holophane" globes. He says that the modern enclosed arc lamp is very convenient, but its lighting duty is low—not better than 2 watts per candle.

TECHNICAL RECORD.

MIDLAND ASSOCIATION OF GAS MANAGERS.

The Autumn General Meeting of the Association was held last Thursday, at the Grand Hotel, Birmingham. Mr. J. Ferguson Bell (Derby), the President, occupied the chair.

The proceedings commenced by the Hon. Secretary (Mr. C. Meiklejohn, of Rugby) reading the minutes of the meeting held at Stafford on June 7; and they were confirmed.

Increasing the Roll.

On the proposition of Mr. B. W. Smith (Walsall), seconded by Mr. H. P. Maybury (Great Malvern), the following gentlemen were admitted to membership: Mr. Hubert Pooley, of Stafford; Mr. T. Jowett, of Solihull; Mr. A. J. Harrison, of Sileby; and Mr. H. O. Timmins, of Tipton.

The President thought the Association were to be congratulated upon having four new members; and he had the greatest pleasure in welcoming them.

The New President and Office-Bearers.

The President said the next duty of the members was to elect the officers for the ensuing year. It was his pleasing privilege to propose his successor in the chair. The gentleman he had to nominate was one who was well known to the members, and who, though he had not been long in the Midlands, had taken an active part and a great interest in the work of the Association. He referred to Mr. Thomas Glover, of the West Bromwich Corporation Gas-Works.

Mr. T. Berridge (Leamington) seconded the motion; remarking that in Mr. Glover they would have a worthy follower of a worthy line of Presidents.

The motion was very cordially adopted.

Mr. Glover, in acknowledgment, said he felt the honour very much indeed, as well as the responsibilities of the office. He thought it was the supreme test of one's loyalty to the Association to accept the office of President, because it involved certain duties which had been hitherto well carried out by a long succession of Presidents. So far as circumstances and his abilities would allow, he would do, as he had done in the past, all he could for the Association.

The Hon. Secretary said he had the honour to nominate for the office of Vice-President a gentleman whose name would be received with unanimity and heartiness. He was practically the founder of the Association, and had always taken an intense interest in its welfare. There was something peculiarly fitting in the nomination, as would be seen when he mentioned that the name he had to propose was that of Mr. Charles Hunt. As he would occupy the vice-chair next year, and would succeed to the presidential chair the year following, there was, as he (Mr. Meiklejohn) had said, a peculiar fitness in the appointment, inasmuch as the Association would then have attained its 25th year; and it would be an appropriate way of marking the completion of that term by placing the founder of the Association at its head.

Mr. J. S. Reeves (Bilston) having been a member of the Association during the whole 24 years of its life, knew something of the part Mr. Hunt had taken in promoting its prosperity; and therefore he was able to say they would not be conferring honour on him so much as doing honour to themselves by electing him later on to be their President. He (Mr. Reeves) had much pleasure in seconding his nomination.

The proposition was carried with applause.

Mr. Maybury moved the re-appointment of Mr. W. R. Cooper, of Banbury, as Hon. Treasurer.

Mr. J. T. Lewis (Wellingborough) said, as this was the first opportunity he had had, he should like to express the regret he felt that their old friend Mr. Peter Simpson was no longer with them to fill the office. This being so, however, he had considerable pleasure in seconding the motion.

The motion was unanimously agreed to.

Mr. Cooper thanked the members for their renewed confidence, observing that it was indeed a great loss not to see the genial face of their departed friend occupying the office.

On the proposition of Mr. A. Cooke (Oldbury), seconded by Mr. J. C. Belton (Chester), Mr. Meiklejohn was again elected to his office of Hon. Secretary.

Mr. Meiklejohn thanked the members for this fresh expression of their confidence. Referring to a remark of the President as to a suggestion that he (Mr. Meiklejohn) made at a previous meeting in regard to retirement, he said that, when he first accepted office, he set a limit to his ambitions. He limited himself to having £100 in the bank, and 100 members on the roll, and the Association 21 years old. Now the Association was 23 years old; Mr. Cooper would have £100 in the bank at the end of this year; and the four gentlemen whom they had enrolled that day, made the total number of members 96. When he first took office, there were 67 members. The Committee, however, desired him to continue in office; and so he should do the best he could for the Association.

Mr. R. King (Wolverton) moved the appointment of Mr. P. H. Fletcher and Mr. J. C. Belton as members of the Committee in place of those retiring by rotation.

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CRUCIBLE FURNACES.
ANNEALING FURNACES.
SAGGER FURNACES
TUBE FURNACES.
BLOWPIPES.
FOOT-BLOWERS.
TINMAN'S BOLT HEATERS.
LEAD POTS FOR PETROLEUM OIL.
BRAZING FORGES.
SOLDERING BOLTS
LADLE FURNACES
DRYING AND STERILIZING OVENS.
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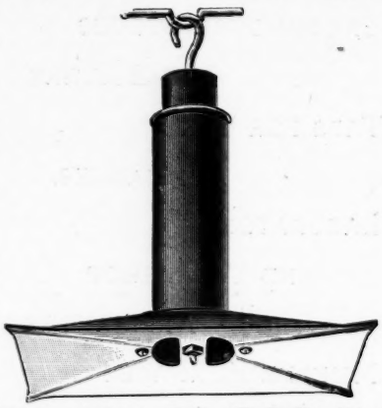

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A NEEDFUL NOTICE

TO ALL WHOM IT MAY CONCERN.

We hereby intimate to Chairmen and Members of Gas Committees, Engineers and Managers of Gas-Works, that we have **PURCHASED THE BUSINESS AND PATENTS OF THE AUTOMATIC COAL-GAS RETORT COMPANY, LIMITED,** Westminster, London, and are now the Sole Owners of the Patents of the pre-eminently successful system of Self-Acting Conveyors and Elevators in combination with the Storage Hoppers, the Measuring Chambers, and the Charging-Shoots, forming together the much admired and happily-designated "powder-pouch" method of charging Inclined Retorts, now in operation, or in course of erection, at—

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PLEASE ADDRESS:

NEW CONVEYOR CO., LTD., SMETHWICK.

Mr. PERCY G. WINSTANLEY (Wolverhampton) seconded the motion, which was unanimously carried.

Messrs. W. A. Sapey and W. G. S. Cranmer were also put into office as Auditors.

THE FRYER FUND.

The SECRETARY next made an explanatory statement regarding the fund which had been raised in aid of the children of the late Mr. James Fryer, of Market Harborough. He said it would be remembered that, at a previous meeting, it was agreed that the Association should, in connection with this fund, work in harmony with the people of Market Harborough. There had, however, been some difficulty and delay in carrying out the distribution of the money; and the project of working in harmony with the Market Harborough people had not been successful in arriving at a definite issue. He had written several times to the Chairman of the Local Committee, but had had no reply whatever. It was therefore suggested at the last meeting of the Association Committee that, as the money was lying idle, and the children were certainly much more in want of it than the bank, they should at once proceed to distribute the fund independently. At the end of last year, he sent a cheque for £10; and he had since forwarded one for £25. The total raised was about £109 12s. 6d.; so that he had practically £75 still to go. He inquired of Mrs. Charles, the administratrix of the estate, whether it would not be convenient to receive the balance at the rate of £25 a quarter. In reply, Mrs. Charles thanked the subscribers very heartily on behalf of the children; and, as to the suggestion that £25 should be paid quarterly, she said it would be most gratefully accepted. Mr. Harris, of Market Harborough, had informed him that the difficulty had been simply due to a little misunderstanding, and that there would be no trouble in realizing the fund from the Market Harborough people for the children.

Mr. A. T. HARRIS mentioned that he was instructed by his Chairman, who was a member of the Local Committee, to say that there would not be the slightest difficulty in obtaining the money from the Market Harborough people, in accordance with the terms of the agreement.

The PRESIDENT said the Committee had decided to leave the matter in the hands of the Secretary; and they could not do better.

The PRESIDENT then read the following paper on

THE STANDARDIZATION OF GAS-METER UNIONS.

There is no recognized standard for gas-meter unions; and hence at the present time great diversity exists between the unions on similar sized meters by various makers. Although the subject has for some time been under consideration, and more than once before the various Associations, who remitted it to the parent Societies, no definite steps have yet been taken to standardize meter-unions, though all are agreed as to the desirability of interchangeable unions, on all makes of wet and dry gas-meters.

It is well known that considerable trouble and unnecessary expense is incurred in changing meters, because manufacturers up to the present have each their own particular size of unions; and it seems to me desirable that some united action should be taken by this Association, rather than that it should be left to individual efforts. Such is the object of this short paper. I would also suggest that similar sized meters should be made as near as possible to standard dimensions, both as regards height and distance apart of inlet and outlet connections.

The meter manufacturers inform me they are agreeable to supply any union upon which a general agreement among engineers has been arrived at as the best and most suitable standard to adopt. Consequently, I have ventured to bring this subject once more before the Association, in the hope that some agreement may be the result, as it is quite time the question was definitely settled, especially as so far back as 1891 the Standards Department of the Board of Trade, in their revised regulations as to gas measuring standards, stated: "It is desirable that the screw-threads of all pipes, connections, or caps, and linings on gas-meter standards should agree in diameter, and in the number of threads per inch with the sizes approved by the Department."

The mere fact of the Standards Department of the Board of Trade going to the trouble and expense of preparing a proposed set of standards for gas-meter connections, is of itself evidence that those in authority are of opinion that the present multiplicity of unions for similar sized meters should be abolished, and interchangeable standards adopted. It is surely a question that Engineers, in conjunction with the meter manufacturers, should themselves decide; and, if necessary, the Standards Department of the Board of Trade could afterwards be approached with a view to legalizing the standards agreed upon.

The objections raised against any changes are that it would cause additional expense, and some inconvenience, and possibly for a time some little confusion. But I venture to think the gain would ultimately much more than compensate for any loss; and, if any change is to be made, the sooner steps are taken the better it will be for all concerned. Further, there is a probability that the Standards Department may at any time re-open the subject, and compel uniform interchangeable unions on all gas-meters; and now that there are so many three, five, and ten light coin meters being ordered for prepayment consumers, it appears an opportune time to meet the difficulty, and try to arrive at some definite conclusion by united action.

This subject is again brought before your notice, not with a view of introducing another set of standards for meter connections, but with the idea of facilitating the introduction of interchangeable standard unions. I have collected and tabulated the particulars and sizes of unions on wet and dry gas-meters as usually supplied by the principal meter manufacturers; and they are given under Schedule A (p. 1206). It will be noticed that the chief dimensions of boss, cap, and lining of meter connections are given for sizes from 3 to 100 lights, both wet and dry meters, and under letters A to L, which represent the twelve principal meter makers, as it appeared to me best to avoid introducing names. The upper part of Appendix A refers to sizes of unions on dry meters; and in this case the variations are not so great as in wet-meter unions. The first five, A to E, are all Edinburgh makers; and as they have agreed to introduce interchangeable unions, I have not tabulated the differences which now exist between them. With reference to the other makers, they all vary more or less; but the variations, it will be noticed, are generally so slight that it would not be a difficult matter to bring all makers of dry meters into line. At present, with few exceptions, they are all exactly the same number of threads per inch; but the diameters and heights of caps vary.

I find, upon making a comparison of the principal outside dimensions of dry meters by various makers, that the height, breadth, depth back to front, inside diameter of connections, and distances between centres of inlet and outlet do not vary much; and, in fact, with little alterations, they might very easily be all made to agree. So much then for dry meters. But, upon comparing the principal dimensions of wet meters, the differences are very much greater; and the same applies to the unions. It will be seen that the number of threads per inch vary along with the outside diameters—in fact, the variations are so considerable that a new standard for wet-meter unions is essential.

As already mentioned, the Edinburgh meter makers have decided, in order to meet the views of the North British Association, to introduce an interchangeable set of unions for dry meters, which comes into operation on the 1st of January, 1901, in order, I suppose, that the new century may begin with unanimity of gas-meter unions, any way so far as the Edinburgh manufacturers are concerned; and I am only sorry they stopped short at dry meters.

It is well known that a movement towards standardizing meter-unions has been in progress in Scotland for some time back, for which credit must, I think, be given to Mr. J. Napier Myers, of Saltcoats, for his praiseworthy perseverance in this matter.

By the kindness of the Edinburgh meter makers, I am enabled to give (see Appendix B) a table showing the sizes of unions for dry gas-meters agreed upon by the Edinburgh makers. In each case the unions used by the leading London makers were taken into account, and the new sizes of interchangeable unions to be adopted were carefully considered, with a view to meeting various makers, and keeping the past in mind, so that the repaired meters would not, in many instances, require new unions. It is a genuine effort on the part of the Edinburgh meter makers to meet the difficulty; and I have nothing but praise to bestow upon the proposal. But it does not altogether meet the difficulty.

I have already mentioned that the Standards Department of the Board of Trade proposed a set of standard sizes for both wet and dry gas-meters, which will be found in Table C; and in this case it would appear the sizes of existing unions were taken into account. However, the new standard proposed was so strongly objected to that the Standards Department did not proceed any further than printing and circulating same, and nothing more has been done up to the present time.

Personally, I think the best and only recognized standard to adopt is the one already in use in all gas-works; and I therefore venture to propose for your consideration that the sizes of unions on wet and dry gas-meters be the Whitworth gas thread, both as regards threads per inch and diameters. Sir Joseph Whitworth's gas thread is universally considered to be based upon the soundest principles of construction and design; and it is hardly likely to be improved upon. Also, in this case, there would be no difficulty in obtaining absolute standards for reference from Whitworths' at any time.

The introduction of gas cooking-stoves and fires necessitates the abolition of 2-light meters, which are found much too small for general use in England. It is usual now in a number of towns to fix 5-light meters as the smallest size for quarterly consumers, reserving 3-light for prepayment consumers; in only some instances are 5-light coin meters used. This being so, I have taken no account of the unions of 2-light meters, for which, if necessary in those districts where rich gas is supplied, I suggest the same sized unions as those on the 3-light meters. Further, it appears to me, besides standardizing the unions for various sizes of meters, it would be an advantage to introduce, so far as possible, uniformity in the diameters of the unions. My idea is to make the unions of two, three, and five light meters, both wets and drys, of the same size—¾-inch. A number of unions on 3-light dry meters are now almost ⅞ inch; and it seems to me ½ inch is too small, especially when taking into consideration that meters should, whenever it is possible, be fixed just inside the outside wall nearest the gas-mains, so as to avoid having upon private premises long lengths of piping conveying unmeasured gas. This means perhaps a long length of piping put after the

APPENDIX - A.

TABULATED LIST COMPILED FROM RETURNS SUPPLIED BY THE CHIEF METER MAKERS.

SIZES OF UNIONS ON DRY GAS METERS AS SUPPLIED BY 12 OF THE PRINCIPAL MAKERS UNLESS OTHERWISE ORDERED.

SIZE OF METER	CAP: MEAN DIAMETER OF EXTERNAL SCREW (A)												CAP: NUMBER OF THREADS PER INCH												BOSS: MEAN DIAMETER OF INTERNAL SCREW (C)												CAP: INTERNAL DIAMETER (F)					LINING: EXTERNAL DIA. OF LINING (E)							HEIGHT OF CAP.											
N° OF LIGHTS	A	B	C	D	E	F	G	H	I	J	K	L	A	B	C	D	E	F	G	H	I	J	K	L	A	B	C	D	E	F	G	H	I	J	K	L	A	B	C	D	E	F	G	H	I	J	K	L	A	B	C	D	E	F	G	H	I	J	K	L
3	1·00	1·00	1·00	1·00	1·00	1·00	·82	·98	·98	·96	1·00	·98	20	20	20	20	20	18	14	18	20	19	20	19	0·980	0·980	0·980	0·980	0·980	0·980		·94	·94	·931	1·01	·98	·75	·75	·75	·75	·75	·72	·65	·70	·70	·70	·68	·71						·56	·50	·50	·50	·46	·46	·56
5	1·17	1·17	1·17	1·17	1·17	1·19	1·04	1·15	1·16	1·13	1·15	1·16	12	12	12	12	12	11	14	12	11	12	12	11	1·16	1·16	1·16	1·16	1·16	1·17		1·10	1·08	1·101	1·17	1·17	·87	·87	·87	·87	·87	·84	·85	·85	·84	·88	·84	·87						·56	·60	·55	·55	·56	·59	·62
10	1·48	1·48	1·48	1·48	1·48	1·47	1·30	1·45	1·45	1·46	1·45	1·51	11	11	11	11	11	11	11	11	11¼	11	11	11	1·46	1·46	1·46	1·46	1·46	1·45		1·40	1·39	1·38	1·46	1·51	1·11	1·11	1·11	1·11	1·11	·97	1·10	1·10	1·10	1·10	1·09	1·12						·62	·80	·65	·66	·63	·70	·68
15	1·48	1·48	1·48	1·48	1·48		1·30	1·45	1·45	1·46	1·45	1·82	11	11	11	11	11		11	11	11¼	11	11	11	1·46	1·46	1·46	1·46	1·46			1·40	1·39	1·38	1·46	1·82	1·11	1·11	1·11	1·11	1·11		1·10	1·10	1·10	1·10	1·09	1·50							·80	·65	·66	·63	·70	·75
20	1·83	1·83	1·83	1·83	1·83	1·78	1·62	1·85	1·80	1·82	1·81	1·82	11	11	11	11	11	11	11	11	11	11	11	11	1·82	1·82	1·82	1·82	1·82	1·75		1·80	1·72	1·74	1·84	1·82	1·50	1·50	1·50	1·50	1·50	1·25	1·35	1·43	1·32	1·45	1·43	1·50						·75	·80	·65	·78	·76	·71	·75
30	2·08	2·08	2·08	2·08	2·08	2·03	1·87	2·05	2·02	2·06	2·06	2·06	11	11	11	11	11	11	11	11	11	11	11	11	2·05	2·05	2·05	2·05	2·05	2·00		2·00	1·93	1·98	2·09	2·06	1·65	1·65	1·65	1·65	1·65	1·50	1·55	1·60	1·51	1·62	1·62	1·62						·86	·84	·70	·84	·78	·81	·87
40		/					1·87		2·02	2·06	2·21	2·28									11		11	11								1·93	1·98	2·25	2·28							1·55		1·51	1·62	1·87	1·75							·84		·84	·78	·81	·87
50	2·26	2·26	2·26	2·26	2·26	2·26	2·31	2·05	2·27	2·25	2·24	2·21	2·28	11	11	11	11	11	11	11	11	11	11	11	2·24	2·24	2·24	2·24	2·24	2·29		2·15	2·17	2·16	2·25	2·28	1·87	1·87	1·87	1·87	1·87	1·87	1·75	1·85	1·81	1·84	1·87	1·75						·86	·90	·70	·90	·80	·81	·87
60	2·46	2·46	2·46	2·46	2·46	2·46	2·31	2·05	2·46	2·45	2·44	2·43	2·52	11	11	11	11	11	11	11	11	11	11	11	2·44	2·44	2·44	2·44	2·44	2·29		2·35	2·37	2·36	2·46	2·53	2·05	2·05	2·05	2·05	2·05	1·87	1·75	2·50	2·00	2·05	2·06	2·00						·86	·90	·80	·85	·86	·87	·87
80	3·01	3·01	3·01	3·01	3·01	3·01	2·94		3·05	2·93	3·00	3·00	2·79	11	11	11	11	11	11	11	11	11	11	11	3·00	3·00	3·00	3·00	3·00	2·91		2·95	2·85	2·92	3·03	2·79	2·40	2·40	2·40	2·40	2·40	2·37		2·45	2·40	2·42	2·43	2·28						1·00		1·12	1·02	·98	1·06	·87
100	3·01	3·01	3·01	3·01	3·01	3·01	2·94		3·05	2·93	3·00	3·00	2·79	11	11	11	11	11	11	11	11	11	11	11	3·00	3·00	3·00	3·00	3·00	2·91		2·95	2·85	2·92	3·03	2·79	2·40	2·40	2·40	2·40	2·40	2·37		2·45	2·40	2·42	2·43	2·28						1·00		1·12	1·02	·98	1·06	·87

New Standard agreed upon by Edinburgh Makers. — *New Standard agreed upon by Edinburgh Makers.* — *New Standard agreed upon by Edinburgh Makers.* — *New Standard agreed upon by Edinburgh Makers.*

SIZES OF UNIONS ON WET GAS METERS AS SUPPLIED BY 12 OF THE PRINCIPAL MAKERS UNLESS OTHERWISE ORDERED.

SIZE OF METER	CAP: MEAN DIAMETER OF EXTERNAL SCREW (A)												CAP: NUMBER OF THREADS PER INCH												BOSS: MEAN DIAMETER OF INTERNAL SCREW (C)												CAP: INTERNAL DIAMETER (EXTERNAL DIA. OF LINING) (F)					LINING: EXTERNAL DIA. OF LINING (E)							HEIGHT OF CAP.											
N° OF LIGHTS	A	B	C	D	E	F	G	H	I	J	K	L	A	B	C	D	E	F	G	H	I	J	K	L	A	B	C	D	E	F	G	H	I	J	K	L	A	B	C	D	E	F	G	H	I	J	K	L	A	B	C	D	E	F	G	H	I	J	K	L
3		·96	·97	·98	·87	1·00	·82	·98	·98			·98		20	20	20	19	14	14	18	20			19		·93	·90	1·00	·86	·97		·94	·94			·98		·68	·69	·83	·63		·72	·65	·70	·70			·71			·50	·50	·46	·54	·56	·50	·50	·50			·56
5		1·15	1·19	1·19	1·13	1·06	1·04	1·15	1·16			1·16		12	18	20	14	14	14	12	11			11		1·06	1·09	1·21	1·12	1·03		1·10	1·08			1·17		·87	·87	·97	·87		·81	·85	·85	·84			·87			·68	·56	·54	·58	·59	·60	·55	·55			·62
10		1·48	1·81	1·58	1·53	1·37	1·30	1·45	1·45			1·51		11	12	14	14	11	11	11	11			11		1·37	1·44	1·60	1·52	1·35		1·40	1·39			1·51		1·06	1·06	1·32	1·18		1·12	1·10	1·10	1·10			1·12			·68	·62	·68	·62	·68	·80	·65	·66			·68
15		1·48	1·81	1·58	1·53	1·37	1·30	1·45	1·45			1·82		11	12	14	14	11	11	11	11			11		1·37	1·44	1·60	1·52	1·35		1·40	1·39			1·82		1·06	1·06	1·32	1·18		1·12	1·10	1·10	1·10			1·50			·68	·62	·68	·63	·68	·80	·65	·66			·75
20		1·81	1·87	1·86	1·76	1·68	1·62	1·85	1·80			1·82		11	11½	14	14	11	11	11	11			11		1·75	1·75	1·88	1·75	1·65		1·80	1·72			1·82		1·43	1·40	1·58	1·46		1·40	1·35	1·43	1·32			1·50			·75	·78	·80	·78	·75	·80	·65	·78			·75
30		2·06	2·19	2·14	2·01	1·87	1·87	2·05	2·02			2·06		11	12	14	14	11	11	11	11			11		2·00	2·15	2·17	2·00	1·84		2·00	1·93			2·06		1·62	1·59	1·76	1·70		1·59	1·55	1·60	1·51			1·62			·75	·78	·81	·78	·84	·84	·70	·84			·87
40		2·06				1·87		2·02				2·28		11						11				11		2·00							1·93			2·28		1·62						1·55		1·51			1·75			·75						·84				·87
50		2·25	2·44	2·14	2·01	2·09	2·05	2·27	2·25			2·28		11	12	14	14	11	11	11	11			11		2·18	2·31	2·17	2·00	2·06		2·15	2·17			2·28		1·87	1·87	1·76	1·70		1·78	1·75	1·85	1·81			1·75			·81	·78	·81	·78	·97	·90	·70	·90			·87
60		2·43	2·44	2·14		2·09	2·05	2·46	2·45			2·52		11	12	14		11	11	11	11			11		2·37	2·31	2·17		2·06		2·35	2·37			2·53		2·00	1·89	1·76			1·78	1·75	2·50	2·00			2·00			·87	·78	·81		·97	·90	·80	·85			·87
80			2·44					3·05	2·93			2·79			12					11	11			11			2·31	2·17				2·95	2·85			2·79			2·12					2·45	2·40			2·28			·78				1·12	1·02			·87
100			2·62					3·05	2·93			2·79			11					11	11			11			2·44					2·95	2·85			2·79			2·12					2·45	2·40			2·28			·87				1·12	1·02			·87

APPENDIX-B

TABLE OF SIZES OF UNIONS FOR DRY GAS METERS AGREED UPON BY EDINBURGH METER MAKERS

SIZE OF METER	SIZE OF CONNECTING PIPE OR UNION OF METER.				
	CAP		BOSS		CAP
NUMBER OF LIGHTS	MEAN DIA. OF EXTERNAL SCREW. A.	NUMBER OF THREADS PER. INCH.	MEAN DIA. OF INTERNAL SCREW. C.	NUMBER OF THREADS PER INCH.	INTERNAL DIAMETER OF F.
3	1·00	20	0·98	20	0·75
5	1·17	12	1·16	12	0·87
10	1·48	11	1·46	11	1·11
15	1·48	11	1·46	11	1·11
20	1·83	11	1·82	11	1·50
30	2·08	11	2·05	11	1·65
40					
50	2·26	11	2·24	11	1·87
60	2·46	11	2·44	11	2·05
80	3·01	11	3·00	11	2·40
100	3·01	11	3·00	11	2·40
150	FLANGED CONNECTIONS				
200		,,	,,		
250		,,	,,		
300		,,	,,		

APPENDIX-C

STANDARD SIZES FOR THE CONNECTING PIPES AND FITTINGS USED WITH GAS METERS, PROPOSED BY STANDARDS DEPARTMENT OF THE BOARD OF TRADE.

SIZE OF METER	SIZE OF CONNECTING PIPE OR UNION OF METER.						
	CAP		BOSS			CAP	LINING
NUMBER OF LIGHTS	MEAN DIA. OF EXTERNAL SCREW A.	NUMBER OF THREADS PER INCH.	EXTERNAL DIA. OF SHANK B.	MEAN DIA. OF INTERNAL SCREW C.	NUMBER OF THREADS PER INCH.	HEIGHT OF CAP D.	EXTERNAL DIA. E.
2	0·98	18	0·70	0·94	18	0·50	0·70
3	0·98	18	0·70	0·94	18	0·50	0·70
5	1·15	12	0·85	1·10	12	0·50	0·85
10	1·45	11	1·10	1·40	11	0·60	1·10
15							
20	1·85	11	1·40	1·80	11	0·60	1·40
30	2·05	11	1·60	2·00	11	0·70	1·60
40							
50	2·25	11	1·85	2·15	11	0·70	1·85
60	2·45	11	2·10	2·35	11	0·80	2·10
80	3·10	11	2·40	3·00	11	1·00	2·40
100	3·10	11	2·40	3·00	11	1·00	2·40
150	3·70	11	3·10	3·55	11	1·20	3·10
200			FLANGED	CONNECTIONS			
250			,,	,,			
300			,,	,,			
400			,,	,,			
500			,,	,,			

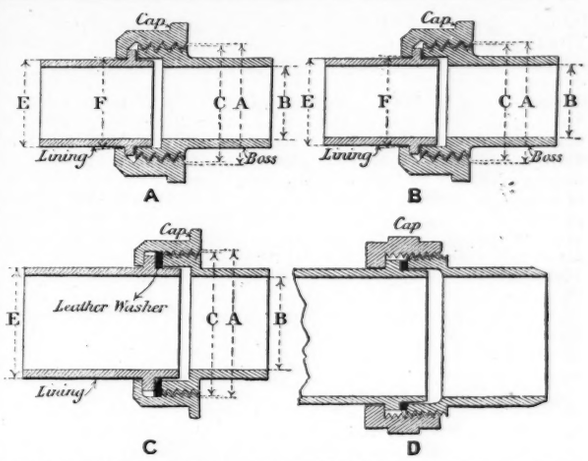
APPENDIX-D

TABLE OF PROPOSED SIZES OF UNIONS FOR WET AND DRY GAS METERS.

SIZE OF METER	WHITWORTH STANDARD GAS THREADS.				
		BOSS			
NUMBER OF LIGHTS	SIZE OF SCREWED CONNECTION	DIAMETER AT TOP OF THREADS.	DIAMETER AT BOTTOM OF THREADS	NUMBER OF THREADS PER INCH.	HEIGHT OF CAP.
3	¾	1·041	0·949	14	0·60
5	¾	1·041	0·949	14	0·60
10	1	1·309	1·192	11	0·80
15	1	1·309	1·192	11	0·80
20	1¼	1·650	1·533	11	0·80
30	1½	1·882	1·765	11	0·85
40	1½	1·882	1·765	11	0·85
50	1¾	2·160	2·042	11	0·90
60	1¾	2·160	2·042	11	0·90
80	2	2·347	2·230	11	1·00
100	2	2·347	2·230	11	1·00

outlet of the meter; and it is well to commence with piping of ample size.

My suggestions are ¾-inch connections for 3 and 5 light meters, 1-inch for 10 and 15 lights, 1¼-inch for 20 lights, 1½-inch for 30 and 40 lights, 1¾-inch for 50 and 60 lights, and 2-inch for 80 and 100 lights; thus reducing the sizes of unions for meters of 3 to 100 lights to a series of six—all unions to be screwed Whitworth gas threads, and the diameter of union boss to be as in Appendix D,



which are the diameters at top and bottom of threads of ordinary gas-tube.

Perhaps those who object to any change will consider for a moment what would be the result if makers of gas-fittings all adopted different threads and diameters for their various fittings. Why, it would be simply unendurable; and there is no apparent reason why interchangeable unions should not be used on all gas-meters.

If a new standard was agreed upon when meters were brought off for repairs, new unions could be added, and the additional cost would probably not exceed 1s. for a 3 or 5 light meter. All new unions might for a time be stamped "S," to distinguish them from those at present in use.

This is a question that requires careful deliberation; and in order that the members of the Association may have the benefit of the experience of meter manufacturers, I have invited representatives from the chief meter makers to be present, several of whom promised to attend. If it meets with the views of the members, I would suggest that the question (after, I hope, a full discussion) be remitted to the Councils of the Institution of Gas Engineers and Gas Institute, with a request that they will take the subject into consideration, and determine a standard for gas-meter unions.

Discussion.

The PRESIDENT said that several gentlemen who were practically acquainted with the manufacture of gas-meters were present; and he would first invite them to give their views, after which the members could discuss the question.

Mr. JOHN G. GLOVER (Messrs. T. Glover and Co., Limited) was first called upon. He said that, although he had not had an opportunity lately of speaking to his co-manufacturers of meters, he thought they would all be deeply grateful if they could get a decided answer from gas engineers throughout the kingdom as to what they really did want. The President had spoken about changing the unions of all meters. Now here they had room for reflection. The President had named a price of 1s.; and this no doubt would pay for altering the bosses. But, for the sake of illustration, supposing they had a meter in the room, they had got to take the meter down, they had to bring it back again, and they had to alter the unions that were attached to the connections in the present position. This to his mind, taking the cost of altering the bosses and the connections, would mean not 1s., but something nearer 5s. They would have to send a man up to do it; and what with the labour, the caps, lining, and bosses, they would find the cost nearer 5s. than 1s. To put it in a plain way: Supposing they imagined there were (he did not say there were) 5 million meters in existence, and the change meant 5s. per meter, this would represent a million pounds or more to alter the connections. To his mind, there was no necessity for this. If the gas industry and the Presidents of the various Associations would follow Mr. Bell's example, and tabulate these things the same as he had done, they would find that two-thirds of the meters that were in existence at the present day were interchangeable, and only about one-third were not. In his opinion, there was no need to introduce a new standard. If they could find two-thirds—if even they could find more than one-half that were interchangeable—then he should say adopt that as the standard; and this would save the gas companies a large amount of money. They, as meter makers, would be only too grateful if the gas industry put in their way fresh trade and more trade; but, to his mind, it would be waste of money. They would be very surprised indeed if gas managers condemned every union, every cap, lining, and boss that was in existence, and say they were going to have standards. He should be very grateful if they would get the Government to say it should be done, because it would put in the meter makers' hands a large new industry, which he hoped would be remunerative to them. The President had referred to Mr. Chaney. Might he (Mr. Glover) be allowed to say that he had certain people in front of him who went back as far as Clegg, and who told him, when he (Mr. Glover) was a boy, what happened when that grand old master of the gas industry, Clegg, started making meters. He

introduced a certain thread, which was taken up by Crosley. The connection now was Messrs. Parkinson and Co.'s; and they introduced the wet meter thread, because dry meters were not known in those days and the dry meter standard was taken from the old Clegg unions. They found the dry meters made in the South were pretty well all the same; but in Scotland they would find that one maker had perhaps as many as half-a-dozen different threads. Now without wishing to make an advertisement for himself (he believed they were there for the one purpose of benefiting the gas industry), he should like to say that he represented a firm who in a very few months' time would have made a million meters; and the whole of the unions were the same, and were in uniformity with other large firms in the South. Therefore, he thought, when he said that two-thirds of the meters made would interchange, he was well within the mark. This being so, he would try, with all respect, to impress on the President the importance of adopting the standard of the two-thirds of the meters in use, and so save the gas industry a large amount of money.

Mr. D. Macfie (Messrs. James Milne and Sons, Limited) thought it must have required some courage on the part of the President to have revived this question, which seemed to have gone asleep; but it was a question that was always cropping up. The President had contributed tabulated information which had never hitherto been before any Association in this connection; and it would be very valuable, and must be considered authoritative. Indeed, the President was to be thanked for getting such a large body of information before the meeting and the gas industry, because it ought to do much to help forward the cause the President had at heart—showing, as it did at a glance, what the real differences were. It was quite true, as Mr. Glover had suggested, that the differences might have been exaggerated in the past. He (Mr. Macfie) agreed with him, and thought they had been exaggerated. But he did not agree with him that one maker might have half-a-dozen different couplings. He did not think any meter maker could have so many, and carry on his business in a proper fashion. He believed all meter makers took steps to correctly fit their own sets of unions, whether they agreed with other makers or not. There was no doubt they all desired to help forward this question; but, at the same time, it could only be effectively settled by getting practical unanimity among all the Associations throughout the country. This could best be done by having the question discussed by Associations such as this, and by representations being made to the parent societies. After that it would be time enough to approach the Standards Department of the Board of Trade, and memorialize them to adopt such a standard as the gas industry might agree upon, or such a standard as the one they (the Board of Trade) already had, and which at one time they proposed to legalize. It seemed to him that it was not so much a matter of what standard should be adopted, as that uniformity and interchangeability should be secured; and he thought this could be attained without such a drastic change as the President had suggested. For the practical difficulty came in as to whether they could always adopt iron-tube thread both in diameter and in pitch. It would be quite possible to devise a series where they would have iron pitch thread, but not necessarily of the diameter of the iron thread, which might be in some cases not quite practicable in the proportions of the unions. Take copper tube, which was largely used for hot-water heating, that tube was always screwed iron pitch; but in each size, the internal diameter always being the same, they could not have the external diameter of its screw the same, because of the varying thickness of the metal. But it was usual to make the screw of iron-tube pitch irrespective of the external diameter of the tube. These screws were the same—that was, of iron-tube pitch—while the external diameters differed. His acquaintance with the steps taken by the North British Association might be an excuse for his referring to their discussion of the question. The President had very properly alluded to the paper read by Mr. Myers some years ago; and in that paper he (Mr. Myers) submitted a range of sizes utilizing iron screw threads somewhat on the lines now suggested by the President. He (Mr. Macfie) found the President and Mr. Myers practically agreed so far as adopting iron-tube thread was concerned, which was the thread that naturally appealed to those who were daily accustomed to its use. Mr. Myers suggested that 1 and 2 light meters should have screws as $\frac{1}{2}$ inch pipe by 14 threads; 3 and 5 light light meters, $\frac{3}{4}$ inch by 14 threads; 10 and 15 light meters, 1 inch by 11 threads; 50 light meters, $1\frac{1}{4}$ inch by 11 threads; 80 and 100 light meters, 2 inch by 11 threads. This was practically the same suggestion as the President made to-day; but Mr. Myers in his paper referred to 1 and 2 light meters. He (Mr. Macfie) supposed that very few members present ever saw or used a 1-light meter; and such meters had practically ceased to be made even in Scotland. Two-light meters were, however, usual; and thousands of them were made throughout Scotland every year. When they sought to abolish, not only 1-light (which everybody would agree upon), but 2-light and 3-light unions, and begin with 5-light ones, he thought perhaps this was going too far. Some makers had properly abolished the 2-light union, even on the 2-light meter, and now sent out 3-light unions on 2-lights. But anything beyond this was, he thought, attempting too much. Following up Mr. Myers' paper, steps were taken to provide a set of gauges on these lines; but no sooner had these been made than it was discovered that some years before a set of standards had been prepared for the approval of the Board of Trade. Mr. Chaney, of the Standards Department, reported that these standard unions had been made in 1888; and it was intended to legalize these standards. This stopped progress in connection with the North British Association movement; and ultimately the Gas Institute (if not also the Institution of Gas Engineers) was approached with a view to taking common action, on the ground that the adoption of standard meter-unions applicable to the United Kingdom was needed. The matter was brought up at the Belfast meeting of the Institute, and was referred to the Council. The Council of the Institute considered it desirable that application should be made to the Board of Trade. Before taking action, however, a circular was sent to all kindred Associations asking for their views and co-operation in the matter; but the result did not appear to have been very encouraging. Several Associations discussed the matter; but the Council of the Gas Institute ultimately intimated that, as the subject seemed to have been dropped, they felt it was unnecessary for them to take any further action. This was the position in which they were to-day; so that the paper and discussion appeared like the beginning of a new agitation. No one wished the agitation anything but success. At the same time, it could only succeed when practical unanimity had been attained. If this was the result of the President's paper, he thought he should be congratulated; but it was not such a small job after all. He had referred to the attempt which the Scotch meter-makers had made in the interval, seeing that a standard had not generally been approved throughout the country. These makers had practically adjusted such differences as existed in dry-meter unions. The differences were very small; but differences that did exist had been eliminated. The set of unions which the President had tabulated was practically interchangeable throughout the country, and this practically met the case. He was far from saying that the set of unions was anything more than an accommodating set. It at all events met the local difficulty; and it attained the end the President had in view. He was quite sure that the Edinburgh makers, as well as the makers in the South, were only waiting to be told what they had to do, and they would be quite willing to meet any reasonable desire on the part of the gas industry.

Mr. J. L. Cloudsley (Messrs. W. & B. Cowan, Limited) thought the President was to be congratulated on the very excellent table he had prepared, and which would be studied with great profit when it appeared in the report of the meeting. He was glad that Mr. Glover and Mr. Macfie had entered so fully into the details of this question; and therefore he (Mr. Cloudsley) did not think he need detain the meeting by dealing so minutely with it as they had done. But a practical course suggested itself to him; and it was this—that the question might be more effectually dealt with if a Committee representative of large and small gas undertakings in the United Kingdom were appointed. They would investigate it with authority; and he was quite sure a recommendation from such a Committee to the Board of Trade would soon settle the whole matter. The Board of Trade were only too ready to adopt whatever the majority of the gas industry desired should be carried into effect; and if they did issue a standard, they would certainly allow some years in which to carry it out—the same as was done when the Sales of Gas Act was introduced. Ten years were then allowed before gas-meters were stamped. In the same way, if a certain standard was adopted for meter-unions, they would grant some years before it was necessary that all unions should be changed. This would, in some measure, meet the difficulty which had been pointed out about the expense. He believed Mr. Glover said that at present uniformity existed in the majority of cases; and he (Mr. Cloudsley) might add that all meter makers were endeavouring as best they could to arrive at uniformity.

Mr. W. Carmichael Peebles said this was, of course, a question which interested meter makers to a large extent. He thought Mr. Macfie struck the keynote of the whole question when he said that it was from the gas industry and not from the meter makers that the decision must come. The meter makers would be only too pleased to fall in line with any suggestion from the gas industry. If they could get to uniformity of couplings, the meter makers would not have to keep such a large stock of different sizes; and they could more easily deliver the orders received from stock, which was, of course, a very important matter. It would help to keep down the cost of manufacture, and so secure getting meters at a uniform price. He, however, thought Mr. Bell was a little unhappy in the suggestion as to the Whitworth thread. He (Mr. Peebles) believed there was really no such thing as a Whitworth *standard* for gas threads. There was what was known as the Whitworth screw. But if they took ordinary wrought-iron pipes and the couplings for them, they would find little differences existed. These were, however, got over by the gas-fitter using his dies and screwing down the pipe; but it would never do for a gas-fitter to go and start on a gas-meter coupling in such a way as that. Certainly he thought the number of threads as used for iron pipes quite good for meter couplings; but they could not get the dimensions in the couplings which pipe threads would require. For example, a three-light meter had a $\frac{3}{4}$-inch connection. Now, a $\frac{3}{4}$-inch wrought-iron pipe measured about 1 inch full outside. A three-light coupling measured about $1\frac{3}{16}$ inches, which would need to be screwed not $\frac{3}{4}$ iron-pipe thread, but 1 inch—viz., eleven threads. Now eleven threads was, he thought, too coarse a pitch for that size. He

thought the present dimensions of couplings quite good in their proportion. They only required adjustment, and perhaps the number of threads brought to the iron screw pitch. The suggestion to bring two, three, and five light meters in a line with regard to size—viz., to make all sizes with 5-light couplings—was not a necessary one, as an inch pipe on a two-light meter was a little bit ridiculous. Take, for instance, the No. 5 union-jet burner passing 5 cubic feet of gas per hour. It had two little pin-holes less than a $\frac{1}{32}$ inch diameter, and a two-light meter passing 6 feet per light—that was 12 feet, or doubling its capacity (say) 24 feet per hour—would supply two to four of these burners. Eight little pin-holes, and a 1-inch pipe to feed them! Then such large couplings would cause—in coupling up and disconnecting—a very great strain upon the light materials of which two or three light meters were made. He had gone into this question of meter-unions with the Scotch makers; and he believed the standards to be adopted would overcome the difficulty which the North British Association of Gas Managers wished to remove. These new couplings would be introduced by the Scotch makers on Jan. 1, and would, he believed, be interchangeable over the whole country so far as dry meters were concerned.

Mr. W. Cheshire (Messrs. Parkinson and Co.) said it was true, as had been pointed out, that the large majority of the meters in the South of England were made on a uniform standard. If also it was true, as Mr. Macfie and Mr. Peebles had pointed out, that the Scotch makers had agreed on a uniform standard of dry meters which would run with all the dry meters all over the kingdom, then they had something like uniformity, because all the wet meters of his firm ran exactly with the dry meters. Therefore, they were getting a good way towards the desired point—if the Scotch sizes were taken as the standard, and they would run with the dry meters of the South. At any rate, it was true they did find in practical experience that they had very little trouble on this account to contend with. They occasionally had to make meters with special connections to suit certain customers; but it was not a great trouble to the makers. He felt with other speakers that the hints and suggestions thrown out in the paper would be a little too drastic. It would mean such a sudden, sweeping change that it would be a very expensive matter; and, as they were so near uniformity, the less alteration they had the better it would be for all concerned. The paper was certainly full of interest, and had been very carefully worked out; while the tables were unique. They would be exceedingly valuable; and he sincerely hoped this ventilation of the subject would lead to some tangible and good result. The meter makers wanted more than anyone to get uniformity. It would save them trouble, and be more satisfactory for all concerned.

Mr. J. Nasmith (Messrs. J. & J. Braddock) said that, if a standard were adopted, the meter manufacturers would be able to make their unions of one size, and therefore would be able to make them in quantities and by special machinery. He did not, however, see that they would lose very much by the present state of things, or that they would gain very much if a universal standard was adopted. A good deal had been said by those in the trade about the difficulty and expense. It appeared to him, however, that this was proceeding upon the assumption that, as soon as ever a new standard was adopted, all couplings at present existing should be altered to that standard, and the whole of the money be expended at once. This did not appear to him to be at all necessary. What seemed to him would be the most sensible course, if a new standard was adopted, would be to make all new meters with unions of one standard; and when they were put into position the old couplings could be taken away, and new connections made to the service-pipe. In this way they would, at any rate as far as new meters were concerned, have the standard in course of operation. Then when old meters came in for repairs, the unions could be entirely changed; so that, when they came out again, they would be fitted with the standard unions. By this means, though the process would be an expensive one, the cost would be spread over a number of years; they would gradually work down those 4 or 5 millions which Mr. Glover at present estimated were in use. This appeared to him to be the only way of meeting the difficulty, unless gas engineers were prepared to spend large sums of money at once. He did not agree with the idea that, if a standard was to be adopted, it should be any other than the Whitworth thread. There was no difficulty about making Whitworth standards, and making a thoroughly good joint; and it seemed to him, however large the change might be, it was not a larger change than was made when the Whitworth thread was first adopted for nuts and bolts. He could remember during his apprenticeship that they used to get old bolts even ten or twelve years after the Whitworth thread was introduced. They used to get nuts and bolts that did not fit, and were not interchangeable; and, as a matter of fact, they got them now. Mr. Peebles had used it as an argument that they did get couplings that were not interchangeable on all screwed iron pipes. It appeared to him (Mr. Nasmith) that the Whitworth thread was very well thought out. It had certain well marked advantages of its own. It was a strong thread, and one not easily crossed. Therefore if a new standard was to be introduced, then he contended the Whitworth standard was the only one which should be adopted. The question had resolved itself into one for gas engineers to settle; but in settling it they must take into account the cost of making the change. But he agreed, although he favoured the Whitworth thread, that if there were already existing threads used by two-thirds of the makers, or in two-thirds of the meters made, it would be far better not to take a standard of that type (the Whitworth) to supersede one that was already largely in use—that was to say, not to take, as a standard, one, however superior it might be in many respects, that was only partially in use. In the much-maligned North, where all these changes were said to occur, there were many towns that had already adopted a standard union, and everybody who made meters for those towns had to make the union of that standard. It appeared to him that the North had had standards of its own, and had worked to them with pretty good fidelity; but the trouble had arisen through the intervention of people from other parts of the country who had come into the district. But it was a fact that the meter makers of the North were making four or five different sizes of unions to suit different people's ideas. In one case they were told to make the meters with an A union, and in another with a B union; and the advantages to them as manufacturers would be considerable if there was only one standard. It seemed to him to be only common sense to take as a standard the sizes of threads which were used by the greatest proportion of the people to-day. It did not matter to the meter makers what standard was taken, provided they made it one standard, because then the manufacturers could adjust their machinery and make that standard just as easily as any other. But it would not be wise to adopt a standard which would knock out the two-thirds for the sake of the one-third. The President's tables formed a long step towards the adoption of a universal standard.

The President expressed his obligation to those gentlemen who had so far taken part in the discussion, and remarked that all that gas engineers wanted was uniform and interchangeable unions. They did not care what size was adopted, or how it was done, so long as it was carried out. He then invited the members to discuss the paper.

Mr. T. Glover (West Bromwich) said several gentlemen who had spoken thought the tabulated statements and recommendations in the paper would be a good step towards national standardization as against local standardization. They had heard the meter makers' point of view; and he would now approach it from the gas manager's point of view. Anyone who had had charge of a fittings department knew the difficulty which existed where they had to buy fittings for a large number of different makers' meters. In one department of which he had charge at one time, they had no less than a dozen different makes of meters; and the first thing they had to do when a man was called upon to change a meter was to refer to the books and see what make it was. Then the difficulty was to go and look round the stores to see if they had a meter of that size and shape in order to change it. If there was no such meter, then it meant making two joints, which took a full hour's time. This very frequently occurred. He was unable to see how the Board of Trade would ever interfere with the unions employed, as it was not a matter that touched the consumers or the public. He hoped the members would not go away alarmed by what his namesake had said. He (Mr. Glover) did not think the change was going to cost anything like the amount mentioned. If ever the Board of Trade did interfere, they would not say: "You have got to change your meter-unions within a given time," because it had nothing whatever to do with the consumer. He thought they might settle this question themselves; and Mr. Nasmith had given them the cue. He said that in the North, where they were pretty cute, many towns had adopted their own set of unions; and this he (Mr. Glover) thought was the key of the whole situation. If they had two-thirds of one maker's meters fixed, and they decided to spread their orders, and give other makers a chance to supply, they could say to these makers: "We give this order on condition that you supply unions uniform with those we have already adopted;" and if any manager approached any of the meter makers under such conditions, they would be only too ready to take the orders. This would settle the question so far as gas managers were concerned. They could do a great deal by adopting the best standard they knew of for their own towns.

Mr. J. T. Lewis (Wellingborough) thought they were all agreed as to the wisdom of having meter-unions that were interchangeable; but some of them did not see the necessity for the drastic change proposed in the paper, as their meters had unions of the same size. At Wellingborough some time since, they decided to give out some orders to meter makers in Scotland. When the first meters came, it was found that the unions did not fit, or would not interchange with the meters already in existence, so they settled the matter so far as they were concerned by setting up standards of their own. Now they simply said to the makers: "We shall be pleased to give you orders for meters, providing the unions are made of the same sizes as those we are now using." This was done at once; and now he never had the slightest difficulty. At the same time, it would be a great advantage if they could have a standard which would be interchangeable, and could be used everywhere. It therefore appeared to him that the most feasible and proper thing to do would be to adopt as the standard the union which was most generally in use. This would soon bring the meter makers into line. One speaker had referred to the coupling-up of meters direct to iron pipe. In his case, many were fixed in that way.

Mr. G. Helps (Nuneaton), while agreeing that there were advantages in standardizing unions, said he could not see that

they were very great. It might be that the experiences of others were different from his own; but he was only speaking of his individual experience. Some people connected up with compo.; others with iron. His own experience had been in favour of the former. With compo. it was an easy matter to change one meter for another; and if the unions had to be changed, the cost of making a joint would not be much. When iron connections were used, he could see there would be a bigger advantage in having a standard than where compo. alone was employed.

Mr. S. MEUNIER (Stockport) spoke of the benefit which a common standard would confer on the meter makers. It would, he said, be very nice from the makers' point of view to have standard unions. They would be able to make them in quantities; and as they had been told once or twice during the discussion, they would put down special machinery, and so save money. But why should gas managers help them to this, if they were not going to get a reduction? At Stockport, by having a standard of their own, they were able to get all they wanted without bothering the Board of Trade or anybody else. At the same time, it was very nice and useful to have standards for nearly everything with which they were connected, because they saved time and trouble. Still he would like to suggest to the meter makers that, if the President was successful in obtaining a permanent standard, they should give the gas industry part of the benefit by making a reduction in prices.

Mr. P. H. FLETCHER (Evesham), while recognizing that it was right to have meter connections of a certain size, said he did not think there was any difficulty in getting them. In his case, the connections were all of one size. He could not agree with Mr. Helps that it was not a big matter to change a meter when they had to make new lead connections. For instance, supposing the change had to be made at dusk; and they had not a fitter handy. Therefore it was desirable the meters should fit. But he had not found any difficulty in getting meters of a certain standard.

Mr. JONES (Brierley Hill) stated that the Association two years ago unanimously agreed that it was desirable a standard should be fixed upon. He would therefore propose that it be remitted to the Committee to deal with the question as they thought best, with the view of carrying the decision into effect. There was no doubt about the utility of a standard being adopted.

Mr. W. A. SAPEY (Tamworth), remarking that they had heard a good deal about two-thirds of the meter-unions being of one standard, said he could not see why the makers of those two-thirds and the makers of the one-third should not come together, and get up a standard themselves. He thought if gas managers would generally adopt the standard of the two-thirds, the makers of the one-third would soon come up to it.

Mr. HUBERT POOLEY (Stafford) also supplied some information as to the work of the North British Association in this direction. He thought the only practical issue of their work was that, if gas engineers chose to use a standard union, the meter manufacturers would make it. Unfortunately, however, there were towns in the United Kingdom that had their own standards already. These were the principal towns; and they would probably be the greatest stumbling-block to a general adoption of a standard.

Mr. J. M'COLL (Halesowen) seconded Mr. Jones's motion.

The PRESIDENT, in closing the discussion, said he was fully persuaded, that, if the meter makers would take the question up, and arrange among themselves for interchangeable unions, it would be to their benefit. The present condition of things frequently meant delay to the gas manager, and additional expense to the meter manufacturer.

The motion was unanimously carried.

Mr. T. BERRIDGE (Leamington) proposed a vote of thanks to the President for his paper. While it had interested him (Mr. Berridge) considerably, he was in the happy position of not experiencing trouble like many others. In the town where he was before he went to Leamington, they had 14,000 to 15,000 meters; and at Leamington they only had two makes, which had to fit one another. Therefore, he did not see where all the trouble came in.

Mr. MEIKLEJOHN seconded the motion; and, on his request, the representatives of the meter manufacturers who had spoken were coupled with the President in the resolution.

The proposition having been unanimously agreed to,

The PRESIDENT briefly acknowledged it.

On the motion of Mr. LEWIS, seconded by Mr. B. W. SMITH, the President and officers were heartily thanked for their services during the past year.

This concluded the business proceedings; but, before separating, "high tea" was served to the members.

Among the Mayors of the new London boroughs elected last Friday we notice the following: Hampstead, Sir Henry Harben, a Director of the New River Company; Marylebone, Mr. E. Boulnois, M.P., Chairman of the West Middlesex Water Company; and Paddington, Mr. John Aird, M.P., a Director of the Gaslight and Coke Company, and Chairman of the Cagliari Gas and Water Company. In the Provinces, Alderman S. Lennard, the new Mayor of Leicester, is Chairman of the Gas Committee. Mr. G. Gummer, the Chairman of the Gas Committee of the Rotherham Corporation, whose term of office as Mayor expired on the 8th inst., was re-elected.

AMERICAN GASLIGHT ASSOCIATION.

The Annual Meeting at Denver (Col.).

Recent issues of the "American Gaslight Journal" which have reached us furnish an account of the proceedings at the twenty-eighth annual meeting of the above-named Association, which was opened in the Brown Palace Hotel, Denver (Col.), on the 17th ult., under the presidency of Mr. George G. Ramsdell, of Philadelphia. At the commencement of the proceedings on the first-named day, there were about 120 members present. The gathering, we learn, was truly representative of the American gas industry, inasmuch as delegates were in attendance from all points of the compass. The first business was the reading of the Council's report, the chief feature of which related to the election of new members. They recommended for honorary membership M. Th. Vautier, who presided over the International Gas Congress in Paris, and held the position of President of the Société Technique du Gaz en France for two years in succession, and the addition of 36 active and 12 associate members to the roll. The report was adopted. The Secretary and Treasurer (Mr. A. E. Forstall, of Montclair, N.J.) then read his annual reports, which showed the Association to be in a prosperous condition; next came the report of the Trustees of the Educational Fund, setting forth the good work which is being accomplished under the auspices of the organization. Mr. Alten S. Miller followed with the report of the Research Committee on the Edgerton standard; and this was succeeded by the nomination of office-bearers. The result was as follows:—

President.—Mr. E. G. Pratt, Des Moines, Iowa.
First Vice-President.—Mr. W. R. Beal, New York.
Second Vice-President.—Mr. Alten S. Miller, New York.
Third Vice-President.—Mr. Rollin Norris, Philadelphia.
Secretary and Treasurer.—Mr. A. E. Forstall, Montclair.

The next item on the programme was the delivery by the President of his Inaugural Address, the text of which was given in the "JOURNAL" for the 30th ult. (p. 1087). Mr. Ramsdell's discourse was very well received—the applause being frequent. After the constitution of some Special Committees, Dr. Auer von Welsbach was elected an honorary member of the Association. Then followed many sorrowful and eloquent tributes to the memory of Mr. George Treadway Thompson, whose death, at the early age of 31, was recorded in the "JOURNAL" last week; the result being the passing of a resolution expressive of the regret felt by the members at the loss the Association had sustained by his removal. Mr. Rollin Norris read the report of the Research Committee on the Harcourt standard; and a discussion followed on the two reports on these subjects. The President subsequently nominated Dr. E. G. Love, of New York, as one of the American representatives on the International Committee, arranged for at the Paris Congress, to draw up "a set of conditions for the regulation of the photometry of incandescent gas-mantles." Another Committee was appointed to award the Beal Medal; the members being Messrs. Alex. C. Humphreys, W. H. White, and Emerson M'Millin.

The reading and discussion of papers then commenced. The first paper to engage attention was by Mr. A. H. Barret, Engineer to the Louisville Gas Company, who dealt with the subject of "Inclined Retorts." He gave, without elaboration, a clear account of what his Company had done; and the results achieved appear to have given satisfaction. A long and spirited discussion followed. Mr. A. E. Forstall read a short paper describing the repair of a broken 30-inch outlet-pipe from a gas-holder; and this brought the opening day's business to a close.

The first thing of special interest in connection with the second day's proceedings was the naming of Boston as the next place of meeting, after which the Association settled down to listen to an interesting lecture, by Dr. E. G. Love, on "The Theory of the Incandescent Gas-Light." A short paper, entitled "The Removal of Tar from Water Gas," read for Mr. W. C. Morris by Mr. Alten S. Miller, followed. The next paper was on "Gas Advertising," read by Mr. Frank W. Frueauff, the Secretary of the Denver Gas and Electric Company. Mr. Henry L. Doherty afterwards advocated with such vigour his scheme for the formation of a National Bureau of Advertising that the Association consented to appoint a representative on the General Committee which is being formed from other Associations to give the scheme practical effect. The paper by Mr. W. C. Anderson, of Norristown (Pa.), on "The Use of Cards for Records and Accounts," brought out a very entertaining discussion, an important contribution to which was made by Mr. Walton Forstall. The next matter was a short paper on "A Blue Glass Pyrometer." The report of the Committee on the President's address followed; and as a sequel thereto a motion to appoint a Committee of three, to report next year on a standard system of keeping accounts, was adopted. Then came the paper by Mr. A. E. Forstall, on "Governmental Control of the Price of Gas," which is given on succeeding pages. Unfortunately, time did not permit of a full debate upon it. The paper set down for Mr. J. H. Walker, of Milwaukee, was not read, owing to his inability to be present. The report of the Committee on Final Resolutions, read by Captain W. H. White, wound up the set proceedings, and closed the technical session of a meeting which, our contemporary says, "lacked nothing from any standpoint, so far as professional interest and its advancement are concerned."

GOVERNMENTAL CONTROL OF THE PRICE OF GAS.

By Alfred E. Forstall, Montclair (N.J.).

[A Paper read at the Annual Meeting of the American Gaslight Association.]

At the last meeting of the Western Gas Association, there was read, under the title "Public Control of Rates," a paper which the author (Mr. George M'Lean, of Dubuque, Iowa) stated was devoted "to the proposition that it is unjust and inexpedient on the part of public service corporations to oppose the principle of public control."* As the writer held very closely to the subject, and did not advance any heretical opinions, the tone of the discussion that followed his reading of the paper was rather a surprise to at least one of those present, as he obtained from it an impression that the general opinion of the speakers was that it was best not to acknowledge the existence of any such right of public control, and to avoid as far as possible any mention of the subject, for fear of stirring up trouble.

This might be a very proper course of action if it were true that the right of public control in some form did not actually exist, and if it were possible, by keeping silent, to prevent the subject from being agitated by others. But nothing was advanced in the discussion to show that either of these assumptions can be maintained.

As far as the existence of the right of public control of rates in some form is concerned, one of the speakers in the discussion made the point that there was no doubt that State Legislatures had this power of control, since gas companies were created by legislative authority, and the creature was always subject to the control of the creator. There can also be cited many examples where such control has been exercised by State Legislatures, such as the fixing of the price to be charged in New York City, and, as a later example, the action of the Maryland Legislature at its last session fixing the price of gas in Baltimore. Moreover, in many of the States the Legislature has given to the municipal authorities the right to regulate the prices charged for gas within the limits of their jurisdiction. The Legislature cannot delegate to others a right that it does not itself possess; but it does not seem that an effort has been made to contest the validity of the right so conferred, even in those cases where, in the exercise of this privilege, the municipal authorities have set a price that has been disputed—the fight in every such case being waged upon the reasonableness of the price prescribed. It would, therefore, seem as if the right of public control of price did exist, and had been well established by decisions of the Courts.

Turning now to the idea that a policy of silence and inaction on the part of gas men is advisable—because if they do not agitate the subject of public control of rates, others will not—can this opinion be held in the face of existing conditions? There is, entirely apart from anything we may do, a strong movement throughout this country in favour of municipal ownership—an extreme form of public control of gas and electric light properties. Several of our members who have attended the annual meetings of the League of American Municipalities, have come away surprised and alarmed by the sentiment in favour of municipal ownership of public service franchises evinced there by men who are sincere in their belief in the benefits to be derived by the community from such ownership. To the efforts of these men, who have united themselves into organizations such as the Association for the Public Control of Franchises, and the Franchise Tax and Municipal Ownership League, both of New York City, are added those of the politicians, who, though they have taken up the cry of municipal ownership from expediency rather than conviction, must, nevertheless, be reckoned with. And even if the out-and-out advocates of municipal ownership as a remedy of universal application for the cure of most of the present ills of the body politic were to be silenced, the subject would still be kept alive by men who, while endeavouring to approach the matter without bias in either direction, are carefully studying this question with a view to reaching a decision based upon the merits of the case as shown by such study. In this class is the National Civic Federation, whose objects are "To provide for the study and discussion of questions of national import affecting either the foreign or domestic policy of the United States, to aid in the crystallization of the most enlightened public sentiment of the country in respect thereto, and, when desirable, to promote necessary legislation in accordance therewith."

This Federation is organizing a national conference, to be held in December, to discuss the subjects of "Industrial Arbitration," "Taxation," and "Municipal Ownership." The Municipal Committee of the Reform Club of New York, which is carrying on an extended investigation of the practical working of municipal ownership, both in this country and abroad, is another example of this class. Thus, whatever our policy may be, the question is being, and will continue to be, agitated by others. Moreover, this policy of inaction is not a new one. In 1883, the President of this Association for that year, taking as his text the existing gas situation in New York City, called attention to the good results that had been obtained from the system of public control adopted in England, and advised action looking to the securing of a similar system in this country. In 1886, a Special Committee of the Western Gas Association, appointed to investigate the question of Gas Commissions, made a majority report in favour of the formation of such Commissions in such States as possessed a sufficient number of gas companies to prevent the cost of the Commission from being too burdensome upon the individual companies. No action followed either of these attempts to rouse the owners of gas properties to an appreciation of the direction in which lay their true interests. The policy of inaction is, therefore, at least 17 years old. Has it improved the situation, or prevented the continuance of agitation? On the contrary, the agitation has increased as the years have gone on, and has been still more intensified in the last two years by the outcry against the formation of the so-called "trusts," with the consequent demand for the publicity of the accounts of incorporated companies.

The right of public control of the price of gas exists; and inaction on our part will not prevent either its application or the discussion of the form in which it shall be applied. Would it not be well for us, therefore, to recognize the trend of events, and, instead of obstinately resisting that which we cannot prevent, endeavour so to guide legislative action as to secure a system of control that shall be to our advantage as well as that of the public? Otherwise it is practically certain that we shall have forced upon us, sooner or later, either municipal ownership or a system of control worked out without our aid by men who, though sincere, have no special knowledge of the various conditions affecting the industry which they propose to regulate. It is certainly to the interest of all that gas engineers and managers should take a part in the formulation of the laws made to control the business with which they are familiar; and their aid would doubtless be welcomed by those who are sincere in their desire to work out the best possible solution of the problem of public control of gas companies. Imperfect though it may be, any system carefully thought out by a representative body of gas men would be preferable to the present liability to control applied with an entire absence of system, under which regulation is limited to action reducing the price of gas, taken by Legislatures or city councils, as the case may be, without any examination of the cost of production or of any of the other conditions which must be considered to enable the fixing of a fair price, with the result that the price so fixed is unreasonably low, and the Courts must be appealed to to save the company affected from having to carry on its business at a loss.

The writer does not feel himself competent to formulate a system that would be applicable to our conditions. Still, as a basis for work for others, it may be well for him to describe briefly the most important systems devised and applied for the regulation of gas companies, in this country and abroad.

In the city of Paris, the price of gas, and the conditions under which it shall be supplied, are regulated by a concession granted to the Gas Company by the Municipal Authorities. This concession is a contract between the Municipality and the Gas Company, entered into in 1855, modified in 1870, and continuing in force until 1905. The price and quality of the coal gas to be supplied are fixed for the whole term of the contract; the price being subject to revision at intervals of five years in case successive commissions of experts, appointed and working under rules specified in the concession, find that there have been made during the interval new discoveries in the art of manufacturing gas, by the employment of which the cost of manufacture can be sufficiently reduced to enable the Company to lower the price. Out of the gross profits for each year, the Company is allowed to pay the interest on its bonds, a specified dividend (13½ per cent.) upon the capital stock, and to set aside sinking funds which will enable it to pay off both the bonds and capital stock at the expiration of the concession. The net profits remaining after these deductions are made are divided equally between the Municipality and the Company. As part of its operating expenses, the Company must pay to the Municipality a sum of $40,000 per year as a return for the grant of the exclusive right to lay pipes for the distribution of gas within the limits of the city, and a royalty of 2 centimes per cubic metre of gas sold (equal to about 11·3 cents per 1000 cubic feet). The Municipality is furnished with gas for street lighting and for use in public buildings at half the price charged to private consumers. Finally, at the termination of the concession, the Company surrenders gratuitously to the Municipality the pipes used for distributing the gas.

Under this system of regulation, no reduction of the price of gas has been made in thirty years, since none of the several Commissions appointed have been able to report any new discoveries in the art of manufacturing coal gas of sufficient importance to warrant a reduction in price, although they have emphasized the fact that the economies rendered possible by good management and increase of business had materially reduced the cost of the gas made by practically the old methods. But these points of good management, and consequent increase of business, not being taken into account in the agreement, and the city being unwilling to forego any portion of its share of the profits, the price of gas still remains what it was in 1869. As this is 30 centimes per cubic metre for lighting and heating, and 25 centimes per cubic metre for motive power (equal to about $1·70 and $1·41 per 1000 cubic feet), for gas of about 13-candle power, it can be easily seen that the gas consumers of Paris are paying much more than their share of the taxes. The Municipality's half of the net profits has averaged, of late years, about $1,500,000. This system of fixed price, fixed initial dividend, and division of the excess of profits between the Municipality and the Company does not, therefore, secure cheap

* See *ante*, p. 21.

gas, and is defective from the consumer's standpoint, when the concession runs (as in this case) for a long term of years. And while the Gas Company pays large dividends, it really profits very little from the high price of gas, for the reason that its business cannot be increased as it could if the price were reduced; and it is probable that the same amount of money could be earned with gas selling at a lower rate. This example may be taken as fairly illustrating the system of governmental control of the price of gas in vogue upon the Continent of Europe.

In Great Britain an entirely different system prevails; the control of the supply of gas resting in the hands of the General Government—the municipalities possessing only the power of inspection necessary to ensure the fulfilment of the conditions imposed by the Government when the gas supply is in the hands of a company, and being themselves subject to Government regulations when the supply is in their own hands. After trying several plans—among them that of fixing a maximum price and a maximum dividend—the system known as the "sliding-scale" is now generally applied to statutory companies, as those companies which secure from Parliament the right to carry on the gas business are called. The distinctive feature of the sliding-scale system is that neither a maximum price nor a maximum dividend is imposed. In their stead, a standard price and standard dividend are specified; and for each increase of 1d. in the price of gas above the standard, the rate of dividend must be decreased ¼ per cent., while for each decrease of 1d. below the standard price the rate of dividend may be increased by ¼ per cent. The standard price and the standard rate of dividend are fixed by a Committee of one or other of the Houses of Parliament specially appointed in each case, after an exhaustive hearing on both sides, as represented on the one hand by the gas company applying for the Act, and on the other hand by the local authorities of the district which the right of supply is to cover. Once fixed, the standards have not been disturbed so far as the capital raised under them is concerned. The same Committee fixes the candle power and purity of the gas—these, with the arrangements for inspection, being usually covered by standard clauses—and the amount of capital stock and of bonded indebtedness that can be issued and incurred. All issues of stock or bonds must be sold by auction, after due advertisement, at a price at least equal to the par value and greater than a reserve price which must be named in a sealed letter which must be sent to the Government Department known as the Board of Trade before the date set for the sale. The combined total of capital and borrowing powers granted is usually sufficient to provide for the estimated needs of the company during a period of from 10 to 15 years, though a recently appointed Committee advised that this period be shortened to five years. When the money so provided has been exhausted, the company must apply to Parliament for power to issue further capital, for which a new standard price and dividend may be fixed. The net earnings can only be applied to the payment of dividends at a rate equal to, or lower than, that corresponding to the price charged for gas, and to the formation of an insurance fund, to the credit of which can be placed each year a sum not greater than 1 per cent. of the paid-up capital, until the total amounts to one-twentieth of such capital. If the profits are sufficient to provide for a dividend at the statutory rate and one of a lower rate is paid, the difference between the amount paid and that which might have been paid may be carried to a reserve fund, which can be built up until it amounts to 10 per cent. of the nominal capital. The fund so formed can be drawn upon to make up the dividend to the statutory rate in years when the full amount has not been earned.

The premiums received from the sale of stock or bonds at prices above their par value are not to be considered as income, but must be applied to new construction as non-interest bearing capital. The accounts of the companies must be kept in the form prescribed by the Board of Trade, and are audited by auditors appointed by the same body, to see that they are correctly kept and the expenditures properly divided between operating and construction accounts. Returns, giving in detail the cost of manufacture and distribution, the profit earned, and the amount of new capital issued, must be made to the Board of Trade by each company, and are published annually as a public document. Although the sliding-scale legislation does not expressly guarantee to a statutory company the exclusive right to the sale of gas in its district, Parliament has not since 1860 authorized more than one company for any one district; so that, in practice, the exclusive right of supply follows the obtaining of an Act of Parliament.

By leaving the rate of dividend which may be paid unlimited, except by the amount to which the cost of gas can be reduced, this system encourages and rewards good management; the economies resulting from which are divided between the stockholders of the company and its consumers. At the same time the requirement that all securities be sold at auction, combined with the necessity of securing parliamentary sanction for the raising of the money required for each period, keeps the capital account at a low point; while the Government audit of the accounts ensures that no operating expenses shall be carried to capital account on the one hand, and, on the other, that no entirely new work shall be paid for out of earnings. This keeps the capital account from being either weighed down by the payment of unearned dividends, or lightened for the benefit of future consumers at the expense of those of the present day.

The Massachusetts Board of Gas and Electric Light Commissioners constitutes the only organized attempt at Government control of the gas business in the United States. This Board is composed of three Commissioners, appointed by the Governor, and exercises general supervision over all the gas and electric light companies in the State. Every gas company is required to make an annual return to the Board setting forth, according to a prescribed form, its operating expenses and income, the amount of its authorized capital, and its financial condition upon a specified day; and these returns are published in the annual report of the Board. Upon the complaint of the mayor or select-men of a town in which a gas company is located, or of 20 customers of the company, either as to the price or the quality of the gas supplied by such company, the Board must, after notification to all the parties concerned, give a public hearing to both the company and the complainants, and may, after such hearing, order any reduction in the price or improvement in the quality of the gas that it deems just and proper. No other gas company shall be allowed to lay pipes in any town in which a gas company already operates without obtaining the consent of the proper local authorities; this consent to be granted only after a public hearing of which due notice is given to all parties interested. An appeal from any decision given in such cases by the local authorities may be made to the Board, which, after a hearing, shall render its decision; and this decision will be final. Gas companies must keep their manufacturing records and books and accounts according to forms prescribed for the purpose; but there is no official audit to make certain that the accounts are properly kept and the items properly classified. The Massachusetts legislation also provides that all new issues of stock and bonds must be for specified purposes, and cannot be made until the Board of Gas Commissioners has voted, after investigation, that such issue is reasonably requisite for the specified purposes for which it is authorized. New issues of stock can be offered proportionately to the stockholders of a company at a price fixed by the Commissioners as the market value of such stock; this market value to be determined by taking into account previous sales of the stock and other pertinent conditions, and to be always more than the par value of the stock. Any stock not taken by the stockholders shall be sold at auction.

In some points this legislation is similar to the English system; but in others it differs very radically from that system. The principal difference is in regard to the regulation of the price of gas and rate of dividend. The Massachusetts plan is practically that of a maximum price and maximum rate of dividend, with a price which is not fixed for any definite period, but is subject to readjustment at any time, and the disadvantage that the rate of dividend is fixed merely by custom and precedent, and not by law, and is, therefore, not an absolutely certain one. The relation between price and rate of dividend must, in justice, be made to depend upon the results that can be obtained by average management; and the best possible management cannot secure any larger returns than are possible under average management. Therefore, there is no incentive to extra exertion; and the public loses the benefit of the share of the results of such extra exertion which it might obtain. Another difference which does not show on the face of legislation is the varying attitude adopted by the auditors in the one case, and the commissioners in the other, towards the question of the proper application of the profits. As stated, the English practice requires all extensions and new construction work to be paid for entirely out of capital. The Massachusetts Board has, in several of its decisions fixing the price of gas, taken the ground that it is right and expedient that part of the cost of extensions should be paid out of income, with a view to lightening the capital burden of the future. A further difference is found in the regulations governing the issuing of new securities. In England, Parliament authorizes the issue of an amount of securities which is estimated as sufficient to furnish all the new capital necessary to enable the company to provide for the expected increase of business for a period of 10 or 15 years; and these securities, once authorized, can be issued in such amounts and at such times as are judged best by the managers of the company. The Massachusetts law apparently requires the issuing of stock in smaller amounts, and the immediate application of the proceeds of such issues to previously specified objects. The systems are alike in that, while neither specifically guarantees the right to an exclusive franchise, each does in its practical application, refuse to authorize competition in the supply of gas. They are also very similar in the regulations bearing on the sale of securities.

The question is, of course, open to argument; but it would seem as if the method of providing for all extensions and new construction by new capital was more just than that of paying for part of these extensions out of income, and thus making the consumers of the present day pay more for gas than would otherwise be necessary, in order that the consumer of the future may benefit from an abnormally low capital account. All that should be required of income in this connection is that it provides a proper depreciation fund, so that the future will not be burdened by capital the plant equivalent of which has disappeared. It would also seem as if the Massachusetts regulations were needlessly and harassingly strict as regards the authorization of new capital, and that they do not afford the incentive to secure the very best possible results that is furnished by the sliding-scale system.

Altogether, the English legislation seems to afford the best

results to both consumer and company. By the exercise of a little ingenuity and thought, we should be able to adapt its salient and essential features to our political conditions, and thus offer to the sincere advocates of organized public control, who recognize that gas companies possess some rights that should be respected, a system that they can accept and for the adoption of which they can work. With their aid, it should be possible for us to free ourselves from the unsystematic public control to which we are now subject, with its attempts at regulation of prices by competition and arbitrary legislative action. This consummation is, at least, one earnestly to be desired and well worth striving for; and the labour of bringing it about is worthy of being undertaken by our Association.

FLY-WHEELS FOR GAS-ENGINES.

At the Meeting of the Manchester Association of Engineers on Saturday week, the 27th ult., Mr. Archibald Sharp, B.Sc., Assoc. M.Inst.C.E., of London, read an interesting paper on "Fly-Wheels." In the course of it he discussed the scientific principles underlying the design of these wheels, both for steam and gas engines, and described several examples of the most advanced practice. Among the improved types referred to was one of the author's design, which he remarked was specially suitable for gas-engines. The wheel had a rim and boss of cast iron, and tangent spokes of mild steel. It had numerous spokes, instead of a small number of heavy arms, so that the unsupported length of rim was small, and the bending stresses were reduced to a minimum. In building the wheel, an initial tension was put on each spoke by screwing up the nuts at the ends; and an initial circumferential compression was thereby put on the rim. The tangent spokes were fastened to the hub by frictional grip alone. The spokes were made in pairs—the middle of each pair being wrapped about half-a-turn round the hub—and lay in a spiral groove, the sides of which were inclined at a very small angle, so that any desired amount of wedging action could be obtained. The rim was free from cooling strains, and, as it left the sand very true, need not necessarily be turned on its outer surface. The spokes were lighter than ordinary cast-iron arms; and thus a saving of dead-weight was effected. It was easily built, and should not cost much, if anything, more than a solid cast-iron wheel of the same character; where it was possible to slightly increase the diameter of the fly-wheel without inconvenience, it should cost less.

In the course of the discussion on the paper, Mr. Atkinson, referring to the practice of Messrs. Crossley Bros. in connection with fly-wheels for gas-engines, observed that the increase of power and stroke in the larger engines necessitated a greater diameter of fly-wheel; and for convenience of carriage by train, it became necessary to make the larger wheels in more than one piece. A good deal of thought had consequently to be devoted to considering how such wheels could best be joined. They overcame this difficulty by an invention of Mr. William Crossley's, in which the wheel was parted right down the diameter, carefully planed, and put together; and on the top of the junction steel plates were carefully fitted upon slightly dovetailed joggles. Bolts were used for the inside. They had to make fly-wheels very much heavier than those used with steam-engines, and quite realized the effect of a heavy wheel on the governing; but the connection between fly-wheels and governors was very different in the case of a gas-engine from that of a steam-engine. One of the best methods of making fly-wheels to contain a large amount of energy was by getting a plain cast-iron wheel, with (say) a trough section of rim, and simply winding it with wire. Such wheels had been very successfully made in America; and they would be as cheap as it was possible to make a wheel. The great objection, however—and it was one which had really prevented them from adopting it—was that they could not take such a wheel to pieces and put it together again without great trouble. Mr. Sharp, in his reply, stated that while the gas-engine was much worse off than the steam-engine for steadiness during its revolution, the two types were practically identical as regards governing under variable loads. At all events, the difference, if any, was not very great.

The Tresenreuter Light.—The form of incandescent gas-light, working by means of gas and air under high pressure, which has been patented in this country by Herr G. Tresenreuter (see *ante*, p. 1026), has, we are informed, been very favourably reported upon by an expert who holds a high official position in Germany. He states that it can be applied at trifling cost to any ordinary gas-bracket; and a small water-motor may be used to provide the necessary pressure. The burner itself presents a very ordinary appearance, and is screwed on to the bracket in the usual manner. No glass chimney is needed. The light is of an agreeable golden colour, though ordinary mantles are used; and its intensity is stated to be about 350 candles. This, however, may be increased by the consumption of more gas to as much as 1000 candles. The necessary power may, of course, be obtained from any convenient source; and a 1-horse motor will, it is said, suffice for an installation of 120 burners. The cost of the light is estimated at one-eleventh that of an electric arc light of considerably lower intensity.

INSTITUTION OF CIVIL ENGINEERS.

EXTRACTS FROM

THE PRESIDENTIAL ADDRESS OF MR. JAMES MANSERGH.

Delivered last Tuesday.

There has been considerable discussion for some time as to whether this year 1900 is the last of the Nineteenth Century or the first of the twentieth; and notable personages among "all sorts and conditions of men" have expressed emphatic opinion one way or the other. My predecessor, judging by certain expressions in his address delivered twelve months ago, holds, I think, the same view as I do myself—that we are still in the Nineteenth Century. I may therefore fairly claim, if I complete my term (with his permission, and by your kindness and confidence), to be the first President of the Institution of Civil Engineers in the Twentieth Century—a great distinction, for which I tender you my very sincere thanks.

Having decided that I would deal to-night only with that special branch of engineering to which my time for nearly forty years has been devoted, it occurred to me naturally to look back to the addresses of those of our Past-Presidents who had preceded me in the same line. These are: James Simpson, in 1854; Thomas Hawksley, in 1872; John Frederic Bateman, in 1878; Joseph Bazalgette, in 1884; and Robert Rawlinson, in 1894. I find that all these gentlemen commenced their addresses with references to many departments of engineering practice and their respective progress—occupying, however, the greater part of the time with matters directly bearing on the provision of water for town supply, and the collection, conveyance, and utilization of sewage.

Mr. Simpson, in 1854, referred to the general introduction of iron pipes for water distribution and of systematic filtration. Mr. Hawksley, in 1872, dealt with the important subject of rainfall, and the obtaining of its accurate registration as providing the prime factor in ascertaining the capability of supply of any given drainage area, with the flow off watersheds of varying form and geological structure, the losses by evaporation, and the discharge by floods. He also referred to the water "wants" of the people, the regulation of fittings, the kind of water best suited to residential or industrial towns, and to the quality from different characters of source—emphasizing, I think, his preference for rivers. Mr. Bateman, in 1878, went into much detail on the rainfall question—illustrating his remarks by reference to specific cases—and discussed fully the question of the quantity flowing off the surface, or percolating into the ground, under diverse geological conditions, the volume of floods, and the dry-weather discharge. He referred eulogistically to the work of that indefatigable collector of rainfall returns, George James Symons, whose death during the past year many of us most deeply deplore. Symons was a good and loyal friend a genial and interesting companion, and the sort of enthusiast in his work that is certain sooner or later to command success. In 1884, Sir Joseph Bazalgette did not enter into any such technical details as his predecessors, for his work had not been so much that of a water-works engineer; but he collected a mass of most useful information with respect to the water and gas supply of a large number of towns all over the world, with many other interesting statistics. Ten years later, Sir Robert Rawlinson dealt shortly and in a general way with the subject, especially referring to London and its main sources, the Thames and the Lea, as only requiring to be preserved from pollution to furnish the raw material for a good and wholesome water supply.

Bearing all this in mind, and feeling that I could add very little of importance to what Mr. Hawksley and Mr. Bateman had said on the points they specially dealt with, I think it will not be inappropriate that I should say something upon one or two departments of our work in which our knowledge has advanced, or our practice been varied, since the last of my famous predecessors occupied this chair in 1878. Of these, the most valuable and practical gain has undoubtedly been our enlarged insight into the very important work done by the ordinary sand filter, which at that time was not expected to do more than remove from the water the suspended matter visible to the naked eye.

In the session of 1882, a paper was read in this room on "The Analysis of Potable Water," by Charles W. Folkard, in which he said, talking of the purification of water: "Filtration is another remedy put forward as infallible by those who have not grasped the subject. How can filtration affect substances dissolved in water? And as for the minute organisms found in putrescent bodies, they could pass a thousand abreast through the interstitial spaces of ordinary sand as used for this purpose." During the discussion which followed, I well remember the late C. Meymott Tidy quoting the following words from the paper: "The germs which cause or accompany disease are endowed with the most persistent vitality, and are capable of withstanding heat, cold, moisture, drought, and even chemical agents, to a marvellous extent," and then exclaiming, in his most emphatic and dramatic manner, "But where are the germs? No such thing as a typhoid germ has been discovered. One could no more analyze a water for the germ of typhoid than one could analyze the brain for an idea."

In the years which have intervened since this discussion, germs, whether known simply as micro-organisms or as bacilli, bacteria, &c., have come very much into evidence, and have to

be taken account of as potent agents for good or evil which cannot be ignored. The specially interesting thing about them to the water-works engineer is that, notwithstanding their minuteness, they are, whether we like it or not, almost entirely removed from water in the ordinary working of a sand filter.

Many of these organisms are known to be perfectly harmless; but some are believed to be the direct causes of disease, such as typhoid and cholera. With regard to the latter, we need not trouble much, because at the present day cholera is always brought to this country from across the sea, and the precautions taken at the ports are so effectual as practically to prevent its ever getting up into the interior; and if that be so, its bacillus can never reach the rivers to infect the water which may be taken from them for town supply below. It is, however, much otherwise with typhoid, which is always prevalent in some part or other of the country; and therefore it is of importance to prevent its organism getting into the water for which year by year increasing communities, both urban and rural, are crying out.

On the question of purity—which means, according to the now generally accepted opinion, the absence from the water, as delivered to its consumers, of any such pathogenic organism—the responsibilities of the water engineer are daily becoming more onerous and exacting. We are thus nowadays constantly confronted with the problem as to what assistance we can hope to obtain from the chemical and bacteriological examination of water respectively. Now, the chemical examination which has been before the public in its present form for over thirty years, enables the skilled analyst to ascertain not only the amount of each mineral ingredient present in a sample of water, but also to determine the amount of carbon and nitrogen contained in the organic matter which the water holds in solution or suspension. From these data, he is able to diagnose, with more or less accuracy, whether, and in what degree, the water has been contaminated with animal or vegetable substances.

The signal service rendered by the chemical methods in detecting sewage contamination is, it may be said without exaggeration, conspicuously reflected in the diminished mortality from typhoid and cholera in this country. There are, however, many waters—often available in very large volume—which are contaminated to such a slight extent only that they differ but very little in chemical composition from waters obtained from unimpeachable sources; and the question has forced itself upon practical men, in view of the ever-increasing demands made by the growth of population, whether such waters must be wholly avoided, or whether they cannot be rendered suitable for domestic purposes by submitting them to some simple process of purification, such as storage in large reservoirs, or filtration through fine sand. Water engineers were, moreover, encouraged in the belief that moderately polluted waters might in this way be rendered reasonably safe and wholesome by the circumstance that such treatment sufficed to make them satisfy the popular demand for clearness and palatability.

But inasmuch as the changes effected in a water by sand filtration are, from a chemical point of view, quite insignificant, the nature of the services rendered by this method of treatment remained completely obscured, and were not revealed until comparatively recently, when the introduction of the now well-known bacteriological methods of water examination have enabled an entirely new interpretation to be placed upon such processes of purification. These new methods were brought to a high state of perfection some seventeen years ago by Robert Koch; and it was in the year 1885 that Percy Frankland first applied them to the investigation of the character of the purifying processes as actually practised by the London Water Companies. This investigation brought out the reassuring and totally unexpected fact that the processes employed were often successful in removing 98 per cent. of the bacteria present in the original water. These inquiries were also instrumental in placing these and other purification processes on a sound scientific basis. Thus among the several London Companies dealing with the same unfiltered water, those achieved the best average result who stored the water for the longest period, and filtered it at the slowest rate through the greatest depth of sand. The effect of storing water in reservoirs as affecting its bacterial purification has also been brought out very markedly by means of these methods; and modes of treatment which were adopted for quite other purposes have since been found to possess remarkable purifying powers, as, for example, Clark's softening process, which removes 99 per cent. of the bacteria present.

The importance attributed to such examination is based on the suspicion that most natural waters may at any time contain bacteria capable of producing disease; and although the greater majority met with are doubtless perfectly innocuous, we require a guarantee that any harmful forms which may be present should be prevented from reaching the consumer. This, in the present state of our knowledge, can be secured only by submitting the water to processes which effect the removal of all bacteria, irrespective of their harmful or harmless nature; and we therefore estimate the value of the process according to the efficiency with which it does this. Whether we are right in so doing is a question upon which I am bound to say I have always had a slight misgiving.

We have learned, without any doubt whatever, that these micro-organisms are ubiquitous, universal, all-pervading; they swarm in their myriads in air, earth, and water, in our food, and in our bodies. We are, however, still groping very much in the dark as to the work they are designed to do in the great economy of Nature. We are accustomed to talk of the majority of them as being simply harmless. May it not be wiser to assume that they are actively beneficent? Further, in removing from the water we drink in London 98 per cent. of those found in the river, in order to capture a stray typhosus or a Löeffler's bacillus (neither of which has ever been found in the raw water), may we not be doing more harm than good?

However, this is taking a pessimistic view of the position, which need not much trouble us, for the health statistics of this enormous community prove conclusively that the risk of harm arising either from the presence in the water of so-called pathogenic organisms or the removal of the harmless is so small that it may be calmly disregarded. A word of warning may, however, be spoken with regard to water obtained from elevated and sparsely populated moorlands; for the danger is, in my opinion, greater if such water becomes infected, especially if not passed through impounding reservoirs, than if it were taken from a large river. I remember a very serious epidemic of enteric fever which occurred at Bangor in 1882, due, it is believed, to the fouling of a small mountain stream high up above Bethesda. Every house upon such a watershed should be under constant, vigilant, and intelligent supervision.

I ought not to pass on to some other subject without saying that, in speaking of pathogenic organisms like typhosus, I am voicing, I believe, the opinions of the majority of investigators in this branch of science all over the world. But I am aware that these opinions are now the subject of acute criticism by some physiologists and pathologists, who regard the whole theory of disease-producing germs as a scientific chimera. Their opinion, they say, is supported by a large number of facts and inevitable inferences; one of the most important being that the identical microbes which are regarded as the cause of specific diseases are constantly found in perfectly healthy persons. I am, of course, not competent to offer an opinion of any value upon these rival views; the scientists must thrash the matter out. But we water engineers must not relax our efforts to provide pure wholesome water for those who entrust us with its supply.

I have not left myself time to speak at any length of alterations in water-works methods since 1878; but I should like to say just a few words about the coming into fashion of the stone dam in impounding reservoir construction. Although Mr. Bateman made many such reservoirs in his time, I believe he never built one with a dam of stone; and I think I am right in saying that the Vyrnwy was the first Mr. Hawksley had to do with. In 1878, I built a small one on the River Wyre, in front of a low weir of Sir Robert Rawlinson's, for the Lancaster Corporation, about 57 feet high above the river, across a narrow gorge, where I could give the wall a curve in plan of only 100 feet radius. In such a situation, the structure could obviously be made lighter than (say) the Rankin type section for a long straight wall.

There is great comfort in building a dam of masonry as compared with making an earth bank; but we should not allow fashion to run away with us, and so build in stone when earth and puddle would answer the purpose equally well at much less cost. I think where we get 100 feet of water behind a dam, it ought to be built of stone; but it is essential, in my opinion, that such a structure should be founded on an unyielding base of sound rock from side to side of the valley. With anything less than this, there may be unequal settlement, owing to the varying weight of the wall, likely to induce fracture. I do not think it is good work to tie a stone wall into the side of an earth valley.

I cannot say that I much admire the American practice of building a composite dam—*i.e.*, part of its length in earth and part in stone—as they are now doing at the New Croton reservoir in New York, which I saw four years ago, and have previously done in many smaller works. They seem to trust in Providence or good luck over there to an extent we dare not do here. In such cases, the core or water-tight barrier in the earth bank is not puddle, as we should make it, but a thin stone wall joined on to the end of the true stone dam. I am not sure that such a core may not be made from end to end of an earth dam, if very special precautions are taken, by well rolling the bank, to ensure that unequal settlement or surging does not take place. I have never yet ventured to try it; but if I do not get nervous as I grow older, I may some day.

Mr. Hill's wall across the outlet of Thirlmere into St. John's Beck is about 50 feet high above the stream bed, and is a very picturesque structure. The Vyrnwy dam is an exceptionally heavy wall, splendidly put together, about 85 feet high above the river; and the granite wall built across the Meavy, on Dartmoor, by Mr. Sandeman, is about the same height, and is a really handsome piece of masonry. I am proud to have been associated, as Consulting Engineer, with this work, for it has a special interest, in that it completes the scheme initiated by Admiral Drake over 300 years ago for the supply of Plymouth. I have not seen Mr. Deacon's wall, built with Aberthaw lime, near Merthyr, nor Mr. Watson's at Gowthwaite, on the Bradford Nidd scheme, and have only sighted the Swansea Cray reservoir works from the railway.

In mentioning these and the three main dams varying from 122 to 128 feet high above ground and the lower submerged wall I am building on the River Elan, I have, I think, named nearly all, if not quite all, the masonry dams of any pretensions in this country. The highest of these is 40 feet lower than the New Croton,

which is not erected, as at first intended, at Quaker Bridge, but 2 miles higher up the valley. I have just received some photographs of this work which represent the wall as being built in horizontal courses of roughly-squared stones—a method which I do not approve. What we want in such a wall is ample weight and good vertical bonding; and this can be secured by building in stones of from (say) 2 to 6 tons in weight, practically as they come from the quarry, and surrounding them with smaller stones and good concrete well rammed in so as not to leave any interstices. We are getting in the Elan walls very nearly 50 per cent. of solid blocks to a little more filling; and the whole structures will weigh, when complete, from 157 to 160 lbs. per cubic foot, and will practically be monoliths. In one of them we have built 100 feet high in two eight-month seasons, and cannot discover by careful examination, or with the level, the slightest indication of settlement.

Ancient Water-Works.

This section of the address was devoted to an interesting description of ancient water-works, particularly of those of Rome; and we may take an early opportunity of reproducing it.

The Law of Underground Water.

In a case which came before Committees of both Houses of Parliament a few sessions ago, the "law of underground water" was described by one of the leading Q.C.'s as "simply silly." This was a strong expression to use, but was not inappropriate as applied to the circumstances of the particular case. Shortly put, the facts were these: The Nottingham Corporation had been pumping for a good many years from certain wells sunk in the pebble beds of the red sandstone, as had also several other local authorities in the immediate neighbourhood; the consequence being that the water-level had been permanently depressed in the wells, a stream called the Dover Beck had had the upper part of its course shortened by several miles, and land in the valley had been seriously depreciated in value for lack of moisture. A few years before this fight, the Newark Corporation had been authorized by Parliament to spend £60,000 upon new works; the water being obtained from a successful well sunk in the same beds at Farnsfield, 4 miles the other side of Dover Beck, and 5½ miles from the nearest Nottingham well at Papplewick.

The Nottingham Corporation now came to Parliament seeking powers to sink three new wells—viz., at Woodborough and Oxton, closely adjoining the Dover Beck, and one 10 miles away to the north, at Boughton. On the new sites they had put down trial borings, so that both the Newark Corporation and the landowners had ample warning of Nottingham's intentions; and the former at once consulted their Engineer (Mr. Henry Rofe), who advised his clients to deposit a Bill asking Parliament to protect them by enacting that within a radius of 4 miles of the Newark well no public body or company should be allowed to sink and pump water to be sent away outside the district—that is, for example, to Nottingham. This was undoubtedly a wise thing to do, as it raised a most important issue in the directest possible way, and was an act of simple self-preservation; for, as the law now stands, the Corporation would have had no redress whatever if pumping at the new Nottingham wells had drawn away their water altogether. The landowners would also have been in a similar distressful condition; and they resolved at once to petition against the Nottingham Bill. It is manifest that it ought not to be possible that this unjust state of things could result automatically from the operation of the law, and that some reform is urgently needed.

As regards overground water, no such anomaly exists, for no public body may abstract water from a surface stream (other than a large river at a low level) without compensating the owners below, either in money or in water; but having made that compensation, they are assured of the water they are taking for supply. Further, no riparian owner may pollute a stream as it passes through his estate, or take water so as to reduce its volume, except for fair and legitimate user upon that estate.

The law of underground water, as it stands, was originally settled, as everybody knows, by a decision of the House of Lords on an arbitrator's award in the case of *Chasemore v. Richards*, in 1859; this being a dispute between the Corporation of Croydon and a millowner on the River Wandle—the latter contending that the pumping at the water-works of the former was diminishing the volume of the stream which he utilized for driving a wheel at his mill. The decision was that there was no right in underground water, unless it could be proved that such water was flowing in a defined and locatable underground channel—a proposition palpably very difficult to substantiate. It could certainly not have been proved either by the Newark Corporation or the landowners who opposed the Nottingham Bill of 1897. Their only hope, therefore, of escape from ruin was to appeal to Parliament not to pass the Nottingham Bill, or in the case of Newark to pass the Bill, which would have operated not only against Nottingham, but also against any other great body desiring to take water away from the Dover Beck district.

As a matter of fact, the Committee of the first House (the Commons) struck out the two offending wells of Nottingham and sanctioned the Boughton, and gave Newark protection, not over the 8 miles circle they asked for—which *was* a rather large order!—but only within the limits of their parliamentary district of supply. The Lords Committee afterwards struck out this protection; and meanwhile the Nottingham Corporation had purchased the right to a zone of protection, 4 miles in diameter, round their Boughton well, having fortunately to deal with only one landowner; and this agreement was approved by the Committee and scheduled to the Act.

At our conference in 1897, I made some remarks on this subject; and I raise it again now, because I realize the serious responsibility which an engineer assumes in advising public bodies or companies to spend large sums of money upon well-sinking and pumping machinery for obtaining water to which their Act gives them no legal right such as is given by an Act for the taking of overground water.

In March of this year, Mr. Shiress Will, Q.C., read a paper at the Surveyors' Institution, which set out in a very clear, and, I believe, exhaustive form, all the important cases bearing on this question since *Chasemore v. Richards* up to the present time;* and in his reply upon the discussion which followed, he said: "I agree with Mr. Richards (who had previously spoken) as regards the hardship inflicted by the existing law in many ways; but I confess that such study as I have been able to bring to bear on the matter convinces me that the law could not with justice be altered in that respect."

I have also given my non-legal mind to a similar study, but feel incompetent to do more than suggest that, by some addition to the Standing Orders of Parliament, Committees may be instructed and empowered to deal with the cases coming before them in what I think would be a reasonable and sensible manner. Some of the cases I have been engaged in have been very interesting and instructive, and have shown that Committees have realized the injustice which may arise out of the law as it exists.

Thus, in 1882, the London and South-Western Spring-Water Bill was introduced, for the purpose of obtaining power to take water from the chalk near Carshalton, just above certain large springs which come out about where the chalk dips under the tertiaries. The result of the Company's operations would, undoubtedly, have been the drying of these springs, and consequently the diminution of water in the Wandle, into which river they ultimately flowed. The Wandle millowners presented a petition in opposition, and the promoters objected to their *locus*, on the ground that they were intending to take only underground water, to which no one had any right. After hearing Mr. Baldwin Latham—whose splendid observational and deductive work in this and other chalk districts is so well known and so highly appreciated—and other witnesses, on the question of a defined channel leading to these springs, the Committee gave the opponents their *locus*, and the promoters, feeling that they could not fight the case on its merits, withdrew their Bill.

In 1884, the Croydon Corporation promoted a Bill for two wells in the same area, one of which would have had, in degree, a similar effect on the Wandle as that just referred to. Again the millowners opposed; and the Committee, having satisfied themselves that serious injury would be done by the pumping from this well, and practically none by the other, struck out the first and sanctioned the second. Similarly, in the Nottingham case I have already referred to, Parliament protected the Newark Corporation and other authorized purveyors of water obtained from wells in the pebble-beds, not by giving them a zone of protection, but by striking out the two Nottingham wells which, under the common law, would have greatly intensified the injury already caused by over-pumping in the neighbourhood.

Thus, in these cases the common sense of Parliament has prevented injustice being done by getting behind the law of the land; but, to use an expressive colloquialism, "this is not good enough." Common sense is not equally and universally distributed, even among the peers and elected representatives of the kingdom; and Committees ought, in my opinion, to have their minds led into the right track, and their hands strengthened to do the right as between all parties.

What I suggest, then, is that when a public authority or a private company promotes a well-conceived Bill for procuring underground water for public supply, and when it can be shown that the source is a proper and rational one under all the circumstances of the case, Parliament, in sanctioning the spending of public or private money (public especially), should at the same time reasonably safeguard the property thus created. This might be done by giving them a zone, having a diameter to be determined after hearing competent evidence, within which no other well should be sunk for the obtaining of water for public supply outside the area so defined.

On the other hand, all persons within the area should be protected somewhat on the following lines—viz.: (1) Those who have spent money in sinking wells or otherwise obtaining water, should, if such water is taken away by the pumping operations of the authorized body, have a similar quantity supplied to them free of cost. (2) Those who have not so spent money, should be supplied at a price to be based upon the cost at which they could, but for the abstraction of the water, have procured it for themselves.

Of course, these are mere suggestions requiring elaboration; but if it were known that such powers would be granted, and such obligations imposed upon promoters, only sound and well-considered schemes would be submitted, and, on the other hand, unreasonable oppositions would probably be materially reduced.

* See "Journal," Vol. LXXV., p. 737.

The settlement of a few cases on these lines would also have the effect of rendering the law of underground water as simple and understandable as is that dealing with surface or overground water.

The question of "support" from underground water, complicated as it is by the fact that in many cases it is impossible to pump water without also withdrawing "ground," is a very difficult one, interesting both to the engineer and the architect; but I will confine myself to what I have said on the "law" as bearing on public water supplies.

Divining for Water.

The President next, at the suggestion of a gentleman whose opinion he said he could not disregard, offered some observations on the above subject, dealing mainly with the investigation conducted by Professor Barrett, a few years ago, at the request of the Council of the Society for Psychical Research. This portion of the address is deferred to some future issue.

Typical City Water-Works.

In thinking over what I should say to-night, it struck me that it might not be uninteresting to compare the water supply arrangements of a few representative cities in the United Kingdom, Europe, America, and Australia, which should form a permanent record in our Minutes of their condition at the end of the Nineteenth Century. With this end I have, with considerable labour and the kindly co-operation of the persons best qualified in the different places to furnish me with reliable information, collected what I believe to be the facts of each case; but time will admit of my doing little more to-night than putting these facts in graphic form upon the screen—if such an innovation in a Presidential Address may be permitted—leaving further details for an Appendix. After being at work some time on this, I found that Sir Joseph Bazalgette's address of 1884 contained a long statistical Table of a much more comprehensive character, to which mine may be considered a postscript up to date, so far as it deals with the same points.

The cities I have selected are London, Liverpool, Manchester, Birmingham, Glasgow, Dublin, Paris, Berlin, Vienna, Rome, New York, Chicago, Boston, Philadelphia, and Melbourne; and in respect of these there will be found in an Appendix the following particulars—viz.: (1) Outline plans showing the sources and aqueducts therefrom to the cities. (2) Plans to the same scale in each case of the districts of supply. Diagrams showing (3) the comparative areas of these districts; (4) the relative populations; (5) the relative growths of population during the last twenty years; (6) the total quantity supplied daily; (7) the total capital cost; (8) the capital cost per head; (9) the cost per 1000 gallons delivered; (10) the daily supply per head; and (11) the cost per head delivered.

I now want to call your attention to the striking fact that, out of these fifteen cities (with a partial exception in Rome), in fourteen the water supply is administered by the public authority as directly representing the ratepayers and water consumers, and in only one by the directors of private companies. This fact I feel I may fairly take as a justification for expressing my own views upon the general question of the proprietorship of water undertakings, and of the London case in particular. Shortly, then, I think the fourteen places are right and the fifteenth wrong, and that the recent recommendation of Lord Llandaff's Commission as to the acquiring by some representative public body of the undertakings of the eight London Water Companies is in accord with the consensus of the best official, parliamentary, and public opinion of the day.

I am not speaking without some experience in this matter. In 1876, I was (as I am still) Engineer to the Stockton and Middlesbrough—now Tees Valley—Water Board, who in that year succeeded in passing through the two Houses of Parliament an Act for the compulsory acquirement of the undertaking of the Company bearing the same name; and for the last ten years I have advised the Birmingham Corporation, who in the previous session, after getting a Purchase Bill through the first House, agreed with the local Water Company without further contest in the second.

In the Stockton case, the Committees decided that the Company should be paid full statutory dividends in perpetuity, or, if a capital payment were preferred, the amount of such dividends multiplied by 25 years' purchase; also a sum for prospective value and compulsory purchase, to be settled by arbitration failing agreement. No agreement was come to; and an arbitration ensued in 1878, under which the Company received an addition of nearly 40 per cent. to the authorized dividends capitalized—an award eminently satisfactory to the shareholders. Although at the time the price was considered very high, it has never been complained of as an improvident purchase by the ratepayers or water consumers, being, in fact, only 26¼ years' purchase of the net income; and no reasonable people in the district would prefer that the transaction had not been accomplished.

In the Birmingham case, the price agreed with the Company was such that the Corporation had been able, between the date of purchase and the introduction of the Bill for the Welsh scheme in 1892, to lower the water charges on two occasions; and it was estimated that the reimposition of rates similar to the Company's, coupled with the natural increase in revenue, would pay interest on the capital outlay of the new great gravitation works.

These two notable cases occurring together, gave great encouragement to the growing feeling of many local authorities in favour of purchasing the works of water companies supplying their districts; and many transfers have taken place in the meantime—some by agreement, and some by direct parliamentary compulsion. I have been concerned in a number of these cases; and, with possibly one exception, all the transfers have been made on terms fair and advantageous to the sellers. Wherever I have been sole Arbitrator or Umpire, my anxiety has always been to give the owners who were being dispossessed of their property the reasonable benefit of any doubtful point; and I am sure that in this way substantial justice to all parties can be, and practically is, always done.

The soundness of the principle—that the purveying of water to the public should be one of the distinctive functions of the responsible sanitary authority of any district—is really incontestible, notwithstanding the persistent and ever-enduring conservatism of some of my best friends, who hold the view that it is something akin to sacrilege to attempt to lay hands upon the property of shareholders in any water company trading either with or without parliamentary sanction. If they are right, then all the great intelligent and energetic business cities in this country are in the wrong; for practically all of them have bought out one or more water companies prior to taking upon themselves what, in my opinion, is their most important public duty. If they are right, the Duke of Richmond's Commission was wrong in 1869; for that very capable body advised the purchase of the London Water Companies. If they are right, Parliament was wrong in approving the Birmingham Purchase Bill of 1875, the Stockton and Middlesbrough Bill in 1876, the Sheffield Bill in 1888, and scores of others. If they are right, Lord Llandaff's Commission was wrong in recommending only last year the purchase of the undertakings of the eight Water Companies supplying Greater London.

In this matter, I wish to be distinctly understood. I have the greatest admiration for the enterprise which years ago provided water for hundreds of towns in this country when there were not in existence public bodies able or willing to perform the duty. I sympathize with their struggles in the early years, when the dividends crept slowly up from nothing to 2 or 3 per cent.; and I think that most of them were righteously earning the full 10 per cent. they were dividing under the General Act, when the unscrupulous greed of a corporation prompted the laying of unholy hands upon their property. Here my sympathies end, and my common sense comes in; and allow me to say, in parentheses, to the younger of my audience that if common sense is not one of the most important accomplishments of an engineer, then my fifty years' experience of active work has taught me very little.

I can quite understand the owner of a family estate objecting strongly to being compelled to sell any part of it for a railway or a reservoir, the construction and user of which will interfere with the amenity and privacy of his residence and grounds; and I can realize how hard it may be when *force majeure* of any sort compels a man to part with old plate or jewels or pictures associated with the memory of his fore-elders. The circumstances would, however, be very special to enable me to believe that any such sentiment can attach itself to the possession of, or the parting with, shares in a water company. This possession brings the owner in (say) £500 a year; and if the result of the transfer of his water company to a public body is to assure him of a similar annual sum *plus* all prospective value inherent in his investment, I cannot for the life of me see where he is hurt, and why such a tremendous grievance should be made out for him by his expert advisers, to whom I have previously referred. I cannot but think that nine out of ten common sense businessmen would say: "Assure me of all the active and dormant value of my present investment in some other shape, and then you may take it, and welcome." As I believe that this is the result attained by the ordinary process of arbitration in ninety-nine cases out of a hundred, I do think it is high time that this false and pedantic sentiment, which stands in the way of transfer, should be allowed to die out.

But I want to carry this matter of the taking over of water undertakings by public bodies a little farther—I am speaking, be it remembered, only of water, because I deem it of great importance, and have little sympathy with municipal trading in general. There is a clause in the Public Health Act, 1875, No. 52, which provides that no public body shall compete with a company having statutory powers within their district, so long as that company are "able and willing" to supply water proper and sufficient for all reasonable purposes, &c. This provision is very frequently an obstacle to any action being taken, because the question as to whether a company are "able and willing" is one that cannot be settled without a costly arbitration, which may or may not result in the company being found in default when all the circumstances of their position are taken into account.

Now I think the time has come when this enactment should either be repealed or so modified as not to hamper an authority anxious to acquire a company's works, and at the same time to deal fairly with the shareholders. I would suggest that the fact of a company being, or not being, able properly to supply water should not have any bearing whatever upon the question of purchase, but that a public authority should be empowered to acquire any water undertaking upon giving reasonable notice—

provided that authority are willing to pay such a price as may be determined by a competent arbitrator or arbitrators, either to be agreed upon between the parties or appointed by some Government Department.

The present method of obtaining powers to purchase by means of a Bill in Parliament is very costly, uncertain, and open to many contingencies and objections. The result depends in great measure upon the preconceived views of the Chairman or other strong members of the Committees, or the force of the advocacy on one side or the other. There are no settled principles or Standing Orders to guide them; and consequently there is no consistency in the decisions of the two Houses in one session or of the same House in two sessions upon the same case. It thus happens that a public authority may be encouraged, or even put under obligation, by a Committee in one session to promote a Purchase Bill in the following session, which they may do at enormous cost, only to find that the Committee appointed to consider the Bill holds entirely different views from its predecessor, throws out the Bill, and much time, labour, and money are lost. After a large experience in the work of Parliamentary Committee-rooms, I am convinced that no more upright and independent tribunals exist. But I am equally certain that, for lack of uniformity and consistency of practice, serious mistakes are not unfrequently made; and for these reasons I contend that, in such an important public matter as that I am dealing with, the procedure should be simplified on the lines suggested.

The question of buying out the eight Companies who provide water for the people residing in the City and County of London and districts outside—a parliamentary area of 620 square miles—has been debated, to my knowledge, for over thirty years. As I have already stated, the Duke of Richmond's Commission advised the purchase in their report of 1869; and in 1880 the matter assumed a very practical form, when, by instructions of the then Home Secretary (now Lord Cross), Mr. E. J. Smith completed provisional agreements with all the Companies. The negotiator was a very able man, and had in the main arranged very fair terms, which might probably have been improved to the satisfaction of everybody, but that unfortunately the Liberals, who were then in opposition, made a party cry of the matter; a large Committee, presided over by Sir William Harcourt, with Mr. Chamberlain as his right-hand supporter, disapproved of the terms, about which the newspapers had befogged the public with misleading interpretations; the agreements fell through; poor Mr. Smith died; and the Conservative Government was deposed. Thus ended ignominiously, by reason of political jealousies, a praiseworthy attempt to negotiate in a friendly spirit an important business transaction, the completion of which would have saved over twenty years of bitter and costly contest; and we are to-day very little forwarder than we were in 1878.

Of recent years, a settlement with the Companies has been delayed, owing mainly, in my opinion, to the wrong-headedness of the London County Council through their endeavouring in every possible way, and with pertinacious ingenuity, to depreciate the value of the undertakings prior to purchase. For myself, I have never seen any essential difference between the London case and scores of others which have been settled either by agreement or by arbitration. The aggregated amount of purchase-money will, of course, be very great; but that involves merely arithmetic, and no new or unusual principle comes in to complicate the awarding of compensation fair and just as between the parties.

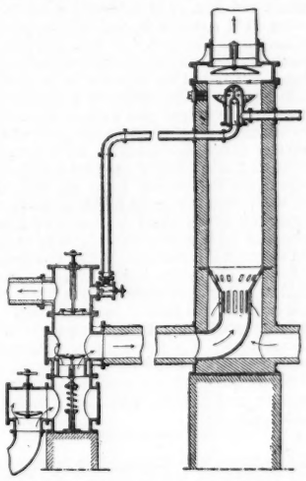
Lord Llandaff's Commission of 1899 have recommended that the Companies' undertakings should be purchased, and the water supply afterwards administered by a permanent Water Board of thirty members, constituted of representatives from the six counties of which Water London embraces parts, the Conservators of the Thames and Lea, and the Borough of West Ham—the Local Government Board appointing the Chairman and Vice-Chairman. With some alteration in the numbers, and in the power to vary them at fixed periods according to the relative populations of the districts they represent, I think this is a workable scheme.

The Drummond Light.—In the course of Professor Lewes's Cantor Lectures at the Society of Arts on "The Incandescent Gas-Mantle and its Uses," which have just been printed in the "Journal" of the Society, he gave Drummond the credit of being the first to show that a piece of dense lime could be raised to intense incandescence by the heat of the oxy-hydrogen blowpipe flame. All the leading text-books on Chemistry likewise attribute this discovery to Drummond. Mr. J. Paul de Castro, however, points out, in a letter to the "Journal" of the Society, that the fact was established by the experimental work of Sir Goldsworthy Gurney, who lived between 1793 and 1875, and was described in his "Course of Lectures in Chemical Science," where an illustration is given of the apparatus he designed and constructed for the purpose. Mr. de Castro quotes the following paragraph from the "Dictionary of National Biography," which, he says, places Gurney's claim in a still clearer light: "He [Gurney] discovered the powerful lime-light known as the Drummond light, because first used by Thomas Drummond (1797-1840) in his trigonometrical survey of Ireland in 1826-7. But Drummond, in a letter to Joseph Hume, the Chairman of a Committee of the House of Commons on lighthouses, stated that 'he had no claim to the invention of the light, for he had it from Mr. Gurney in 1826.'"

REGISTER OF PATENTS.

Compressing Air and Gas.—Gobbe, E., of Jumet, Belgium. No. 23,765; Nov. 28, 1899.

This apparatus for use in compressing air and gas mainly consists (as shown) of an explosion-chamber constructed of a sheet-metal cylinder, lined with fire-resisting material protecting the metal from the action of heat. The explosion-chamber is connected at its lower part with two pipes, through one of which air is conducted into the explosion-chamber, while the other similarly supplies the chamber with gas. At the top, the explosion-chamber communicates with a chimney of sufficient height to ensure an adequate draught, for which purpose it may be connected with a mechanical suction appliance, or simply with a steam-jet extractor. At the base of the chimney is arranged a valve kept open by its own weight, and adapted to descend but a little distance below its seat. At the extremities of the air and gas pipes respectively, there are provided



delivery-valves and suction-valves, which, by means of springs, are raised a short distance above their seats. Regulating-valves enable the amounts of air and gas admitted to be controlled or varied as required, so as to obtain a suitable mixture for explosion in the explosion-chamber. The air and gas meet after passing through a tuyere, provided with a number of perforations, which serve to agitate the air and gas to thoroughly mix them; while an igniter situated near the top of the explosion-chamber receives compressed gases from collectors. The flame produced in this igniter passes through a number of small perforations of a fire-resisting piece forming the cap of the igniter, which is fitted with a perforated dish or "basket" adapted to receive incandescent charcoal or the like for starting the apparatus.

Combined Gas-Motors and Compressors or Blowers.—Crossley, W. J., of Manchester, and Atkinson, J., of Marple. No. 24,494; Dec. 9, 1899.

This invention relates to combined gas-motors and compressors or blowers, in which the pistons of the compressing cylinders are driven direct by the pistons of the gas-motor cylinders, or, at any rate, so driven as to complete their strokes together.

A specially suitable application of this invention (the patentees point out) is to blowing engines, for compressing the air used for blast in a blast-furnace, and driven by the gas from the furnace itself. Such gas has a very low thermal value; and it is of importance that the residual burnt gases left in the combustion-chamber of the motor-cylinder at the termination of an exhaust-stroke, should be scavenged out and replaced by pure air. The object of this invention, therefore, is to take scavenging air from the compressing cylinder, utilizing mainly the air left in the cylinder in its clearance spaces, so as not to materially reduce the volume of air delivered by the compressor.

The main feature of the invention consists in a method of scavenging in which a volume of air is conveyed from the compressor to the motor-cylinder by a pipe, provided with valves, one at each end, which are automatically closed, except at the termination of an exhaust-stroke, when they open to permit the passage of air for scavenging the motor-cylinder. To effect this, the combined engine and air-compressor has the air-compressing piston driven direct by the piston of the motor, and has also the combustion-chamber of the motor in communication with the compressing cylinder, at certain periods, by a pipe, provided with automatically-worked valves.

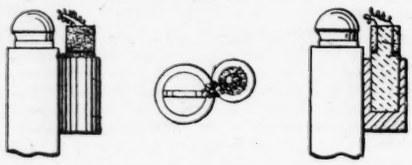
Internal Combustion or Explosion Engines.—Heys, W. G.; a communication from J. J. Heilmann, of Paris. No. 11,247; June 21, 1900.

This invention relates to a type of explosion motor (operated by gas or petroleum) having cylinders containing two pistons each, between which the explosive effort takes place. It consists in an arrangement of parts and means by which the explosive shock upon the pistons is transmitted to a crank or cranks, with the best equilibrium among the parts in movement, and with the least shock or jar upon the frame; and in means for ensuring a constant lubrication of parts—enabling also their easy examination while at work.

Self-Igniting Gas Mediums.—Archer, D. J., of Toronto, Canada. No. 11,517; June 25, 1900.

The object of this invention is to prevent the coalescing (caused by heat) of the atoms of platinum black in powder form used to cause the gas to ignite, and to render the platinum wire employed therewith incandescent in the shortest possible space of time after the gas has been turned on.

The illustrations show a side elevation of an ordinary gas-burner with self-igniting gas medium attached thereto, and a vertical section and plan through the medium, showing its construction.



It is well known (the patentee remarks) that platinum black will occlude a large quantity of oxygen from the air, and that, if a stream of hydrogen be directed upon it, the chemical combination of the two gases takes place with sufficient energy to raise the temperature of the platinum black until it becomes red hot, or is sufficiently hot to render incandescent a platinum wire held against it, and which, being situated where the air and gas mix, ignites the gas. It has, however, also been found that repeated heating of the platinum black causes the atoms to coalesce; and when this has occurred, they are not in a finely-enough-divided condition to occlude oxygen at the ordinary temperature and cause the combination therewith of hydrogen gas with sufficient rapidity to render the platinum wire incandescent when in the path of the gas. To overcome these defects, the patentee claims to have invented the following process of manufacturing self-igniting gas mediums: Bone-ash is heated sufficiently to remove all impurities from it, and after cooling it is thoroughly mixed with water so as to make a paste that can be easily worked, in the proportion of one-third bone-ash to two-thirds platinum black. This mixture is put into a mould, so as to form a pellet, preferably with a hole through the centre. When the pellet is in the mould, it is dried or baked in a gradually rising temperature, until it is hard enough to be handled without damage. It is then removed from the mould and put into a flame and heated to a red heat. When it becomes red hot, the pellet is removed from the flame, and allowed to gradually cool off in the atmosphere. By mixing the platinum black with the bone-ash, and treating the compound in the manner described, it is said that the atoms of platinum black are prevented from coalescing, by the atoms of the bone-ash; and thus their efficiency to occlude oxygen from the air will not be impaired.

Gas Lamps and Lanterns for Exposed or Inaccessible Positions.—Himmel, G., of Tuebingen, Würtemberg. No. 11,615; June 26, 1900.

This invention relates to the employment of incandescent gas-lamps elevated on masts or poles and in other inaccessible positions for illuminating open spaces. It formed the subject of one of the papers presented to the recent International Gas Congress in Paris.

As is well known, the patentee remarks, some gas lanterns or lamps have to be lowered at intervals for the purpose of being cleaned, and of enabling the burners to be examined. It is therefore necessary that the lantern or lamp should be removable from the gas supply or admission socket, which is rigidly attached to the pole, and, by an automatic horizontal displacing device, should be capable of being brought out of the way of the gas-supply socket, so that no impediment prevents the lantern being lowered. This device for automatically displacing the lantern vertically out of the way of the gas-supply socket also allows of the automatic insertion of the lamp in the gas-supply socket when the lamp or lantern is again drawn up to the top of the pole. The socket is provided with a cock-plug, by means of which three different positions can be obtained—that is to say, three distinct gas-supply passages may be opened or closed, according to whether the lighting, or only the permanent flame, or both of these and the pilot-flame are to burn. The adjustment of the cock-plug takes place by means of a draw-bar from the ground, or from a staging or basket situated on the pole. Beneath the lantern a gas-supply cone is fixed to the pole, which cone, after the lantern has been drawn up, is inserted in the socket by means of the horizontal adjusting device, and supplies gas to the lantern from its different holes or bores—that is to say, to the lighting flame, the permanent flame, or the pilot-flame, according to the position of the cock-plug.

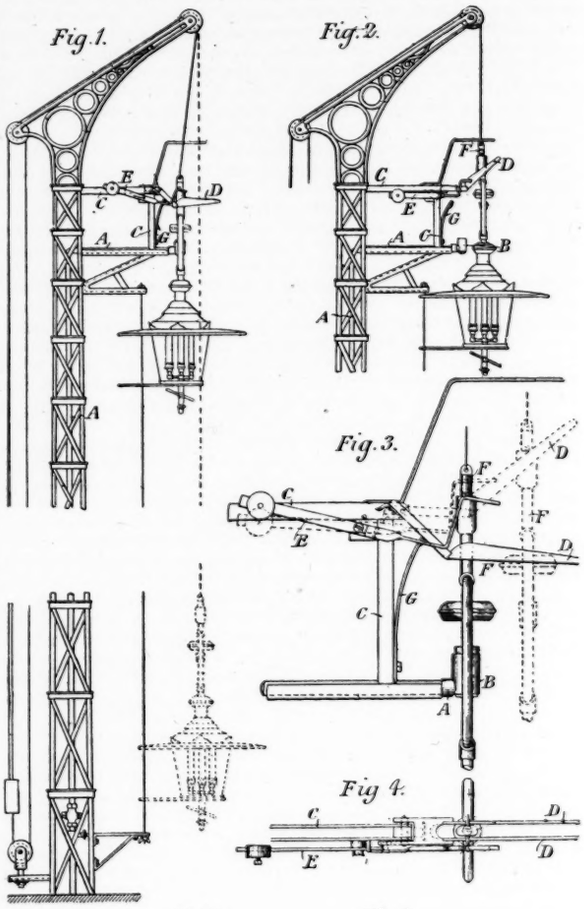
One form of the invention is shown in the engraving, in which figs. 1 and 2 show the device for automatically connecting the lantern with the gas-pipe on a mast or pole. Figs. 3 and 4 are vertical and plan views of the inserting device. Fig. 5 is a section of the socket-casing and cock-plug, as well as the supply-cone situated on the lantern or lamp. Fig. 6 is also a section of the socket-casing with the plug and cone seen from the front. Figs. 7, 8, and 9 show the different positions of the plug.

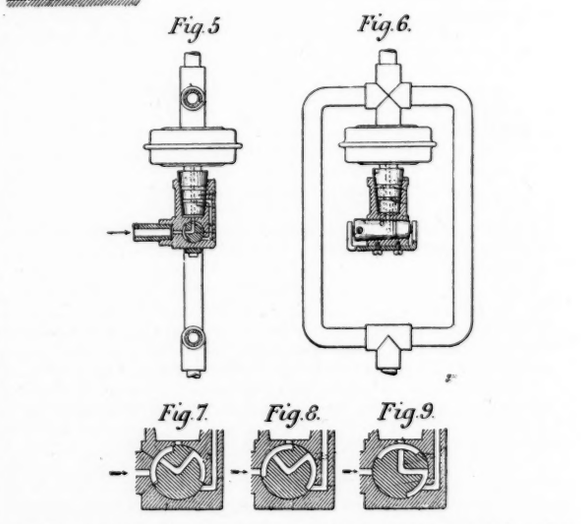
The supply of gas to the lamp takes place through a pipe A and a socket or nozzle B, from whence the gas passes to the lamp through a cone or plug and a lyre-shaped suspension-frame. When the lamp is drawn up by means of the cord shown, the following arrangement is employed, in order to obtain an exact and automatic insertion of the cone in the gas-supply socket, which latter is rigidly connected with the mast or pole. An elbow-frame C, connected with the standard, is placed on the frame carrying the gas-pipe. On this elbow-frame a forked bell-crank is pivotally mounted by pins; and on the front end of the lever a fork D is mounted, while on the rear end (in proximity to the pivots) is another small elbow-piece. A double-cranked lever E, pivoted on a screwed pin, is also mounted on the elbow-frame C, being held in a given position by means of a counter-weight arranged on its rear arm, and the front part of the said lever being bent in a double right-angle form. When the lamp is in a position for use, and its lyre-shaped frame carries above in the centre a suspension-tube F provided with a guiding-hub from which the lantern is carried by the suspension cord, the fork-shaped lever D and the double-cranked lever E occupy the position shown in full lines in fig. 3. The guide-socket or hub of the lamp lies between the two arms of the fork D, and one of the two cross-pins (fig. 4) rests upon part of the double elbow-lever E, and holds it firmly in the position shown in full lines in fig. 3—the two cross-pins being arranged on the tubular-piece F above the socket.

If, then, the lantern, for the purpose of being lowered, is drawn up a little from the fork D, the lever E, in consequence of its weight, alters its position, and assumes the position shown in dotted lines in fig. 3, and is held fast in this position by encountering a pin fixed on the frame C. By this drawing up of the lamp, the cone comes out of the socket B. The plug must have been previously brought into the position shown in fig. 9, by which the admission of gas to the lamp is prevented.

In the lowering of the lamp or lantern which then follows, the pins rest on the arm of the fork, and it is pressed back until the pins come underneath, whereupon it is again automatically returned by the spring G into the position shown in full lines in fig. 3.

When the lamp is again drawn up to the top of the pole (to bring it into its position for use), the upper cross-arm of the lamp-frame first turns the fork-piece D upwards, until it occupies the position shown in dotted lines in fig. 3. The elbow-piece of the forked lever then rests





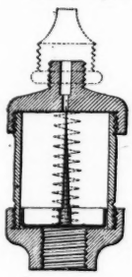
against a projection formed on the inner side of the lever E, and projects laterally therefrom, preventing the forked lever from turning back. The latter remains stationary in the position shown in dotted lines; and the pins attached to the suspension-tube F slide down the upper surface of the inclined fork D, which then occupies such a position that the cone is automatically inserted in the socket B, and there fits tightly. Before, however, the cone is finally seated in the socket, the pins encounter the elbow-piece of the lever E, and turn it, whereby the lateral projection of the lever is depressed, the bent piece is disengaged from it, and the fork lever drops until it encounters the end of the spring G, and is stopped by it. Thus the lamp which has been lowered, when drawn up again into position, is automatically conveyed into the correct place.

When the lamp is lowered from its highest position into its position for

use, the cone (as already described) enters the supply-socket B, and fits tightly therein—being attached to the lyre-shaped suspension frame of the lamp. The plug then, by means of a cord communicating with the ground-level (or a basket or platform on the pole), is brought into the position in which the supply of gas is turned on for the lighting of the permanent and the starting flames (fig. 8), by which means, if the igniting flame be lit by a spirit light or a platinum wire device, both the permanent and also the lighting flames are ignited. In the position of the plug shown in fig. 8, the gas flows through the main pipe into recesses, whence it partly passes through the central passage of the plug to the lighting flame, and partly through a passage connected with one recess into a second recess, which, in turn, is connected with two passages in the casing of the socket, which lead to the permanent and the starting flames respectively through openings provided in the cone, with which the pipes to the permanent and lighting flame are connected. As soon as the permanent and the lighting flame are ignited, the plug is again turned, either into the position shown in fig. 5, in which gas is conveyed both to the permanent as well as to the lighting flame, or, in case the lighting flame is to be extinguished (for instance, in the day time), it is brought into the position shown in fig. 7, in which all the connections except to the permanent flame are shut off. Thus, as long as the lamp is in the position for use, it is always only necessary to effect a change of the cock from the position shown in fig. 5 to that in fig. 7, or *vice versâ*, in which either the permanent and the lighting flame or the former alone are kept burning. When the lamp has to be lowered to be cleaned, the plug is brought into the position shown in fig. 9, in which all the passages are closed.

Pressure-Regulators for Gas-Burners.—Ackermann, F., of Nordhausen, Germany. No. 13,563; July 27, 1900.

This gas-pressure regulator consists of a conical needle-valve projecting from a plate or cup (of suitable weight) arranged within a cylinder or extension in the gas-supply pipe. The cup has sufficient free space in the cylinder for the desired quantity of gas to freely pass to the burner, when the pressure is normal. When, however, the pressure increases, the cup will be raised and the needle pressed upwards into the passage according to the pressure of the gas and the weight of the cup, so that an equilibrium is established. Since the needle is a conical valve—*i.e.*, increasing in section towards the bottom—it is evident, that the outlet orifice will be reduced in proportion to the height to which the cup is raised, thereby reducing the quantity of gas issuing from the burner in proportion to the increased gas pressure.

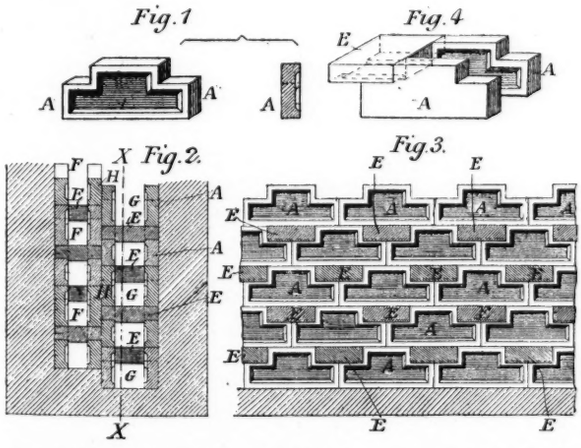


The weight of the cup is empirically fixed according to circumstances, so as to correspond to the normal pressure. It can, however, be replaced by a spring arranged between the base-plate upon which the gas-pressure acts and the top of the cylinder—the spring power being previously regulated or chosen.

Regenerative Furnaces and Bricks Therefor.—Gibbons, W. P. & G. B. A., and Masters, E., of Dudley. No. 16,256; Sept. 12, 1900.

This invention refers to the construction of the gas and air passages of regenerative furnaces, and in bricks for forming the vertical walls of the passages.

Fig. 1 is a projected view and a cross-section of one of the bricks referred to; fig. 2 is a cross-section of a part of the gas and air passages of a regenerative furnace constructed according to this invention; fig. 3 is a sectional elevation on the line X of fig. 2; and fig. 4 is a projected view of a portion of the same.



The bricks for the vertical walls of the passages are made (fig. 1) with an indented panel on one face, corresponding with the outline shape of the brick, so as to reduce its thickness and weight and the thickness of the division-walls, without reducing their strength. Each brick A has an upwardly projecting rectangular lump, the length of which is about half that of the brick, leaving two equal rebates at either side to receive the cross-tiles E, which form struts to keep the walls the proper distance apart, and "being heated by the waste gases, give up their heat to, and split up, the incoming gas and air when the furnace is reversed."

In building the air and gas passages F G, the bricks A are laid in courses end to end (see figs. 2 and 3), and the rebated cross-tiles E are laid in the rebates between the lumps, so that there are cross-tiles and lumps alternately. In the wall H, between the air-passage F and the gas-passage G, the panelled bricks are placed back to back (see fig. 2), and are so arranged—as is usual with other bricks—that the joints of the bricks in one course miss the joints in the other course, so as to prevent bye-passing of the gases.

APPLICATIONS FOR LETTERS PATENT.

19,310.—Stevens, A. A., "Gas-engines." Oct. 29.
19,337.—M'Donald, D., "Acetylene gas generating apparatus." Oct. 29.
19,363.—Ehmann, C. P., "Incandescent gas-burners." Oct. 30.
19,365.—Bingham, C., "Acetylene generators." Oct. 30.
19,368.—Levetus, E. L., "Acetylene generators." Oct. 30.
19,370.—Rydill, G., "Socket filters, and appliances for fixing the same firmly to the ends of taps, valves, and pipes made capable to resist internal or external pressure for water, steam, gas, or air." Oct. 30.
19,377.—Crossley, W. J., and Atkinson, J., "Gas-producers." Oct. 30.
19,452.—Daw, F. W., "Chimneys for illuminating burners." Oct. 30.
19,475.—Jones, P. C., "Incandescent gas-burners." Oct. 31.
19,482.—Crossley, W. J., and Atkinson, C. J., "Internal combustion motors." Oct. 31.
19,534.—Metropolitan Gas-Meters, Ltd., and Forster, J. D., "Prepayment gas-meters." Oct. 31.
19,535.—Winkler, H., "Incandescent gas-burners." Oct. 31.
19,568.—Loiseau, R. T., "Employment of compressed air or gas for transmitting force or motion." Nov. 1.
19,604.—Wise, W. L., "Gauging the temperatures of substances which become luminous or incandescent when heated." A communication from E. F. Morse, J. D. Cox, and F. F. Prentiss. Nov. 1.
19,648.—Purser, H. E., and Glover, F. T., "Tubing for the delivery of liquids or gas." Nov. 2.
19,697.—Guimaraes, J., "Gas-lamps." Nov. 2.
19,760.—Harvey, E. C., "Gas heating and lighting appliances." Nov. 3.
19,772.—Bowley, J. W., "Lamps." Nov. 3.
19,776.—Mallol, J., "Incandescent gas-burners." Nov. 3.
19,778.—Smith, A. D., Macdonald, W. D., and Rolls, C. S., "Burners." Nov. 3.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Paris Gas Company's Coal Contracts.

Sir,—I have read in the "Journal" for the 30th of October your remarks in reference to some contracts made for three years for Durham gas coals by several gas companies, the Paris Company among the number. I had noticed, as others had done, the statements made by the Newcastle papers; but we did not trouble to contradict them, as it seemed to us that the readers of those papers were in a position to estimate their real value. But as you have reproduced them, and your readers may be misled thereby, I beg to inform you that they were incorrect. I cannot say anything as to the other companies, but I can assure you that the Paris Gas Company have not made any coal contract at 13s. 9d. per ton for a delivery of 100,000 tons per annum during three years. We have not entered into any contract for Durham coal since the beginning of May; and the prices paid were lower than those stated in the articles you have read. It is not at a time like the present, when everything justifies us in reckoning upon a fall in prices, that we should agree to pay such high rates. It has been a matter of surprise to me that the Newcastle papers should have given publicity to statements the accuracy of which they could have easily verified.

A. Boistiere,
Chief of the Coal Department.

Paris Gas Company, Nov. 8, 1900.

LEGAL INTELLIGENCE.

SUPREME COURT OF JUDICATURE—COURT OF APPEAL.

Thursday, Nov. 8.

(*Before the* Master of the Rolls *and Lords Justices* Collins *and* Sterling.)

Welsbach Incandescent Gas-Light Company, Limited, v. United Chemical Works.

Mr. Neill applied *ex parte* that an appeal by the defendants from the order of Mr. Justice Day, made in Chambers, granting an injunction restraining infringement pending the trial, might be marked "urgent." The defendants began manufacturing, advertising, and putting their mantles on the market in March last. The plaintiffs knew all about it in April, for they actually threatened and proceeded against customers of the defendants.

The Master of the Rolls: Have you been put under terms not to go on selling the mantles?

Mr. Neill: Yes, and not to advertise. The learned Judge also enjoined the defendants against representing that their mantles were not an infringement of those of the plaintiffs.

The Master of the Rolls: This is one of the many actions which the Welsbach Company have had to bring to prevent their mantles being infringed?

Mr. Neill: Yes. The writ was issued in August, and an interim injunction obtained in the Vacation; but when the summons was heard by Mr. Justice Farwell, he declined to continue the injunction, on account of the delay and of the attack on the validity of the patent. The plaintiffs then stopped the action, commenced a fresh one, and took out a summons in Chambers, which came before Mr. Justice Day, in respect of the same mantles, the same infringement, and the same parties. One of the reasons for asking that the matter should be marked "urgent" was that, owing to the defendants having been allowed to go on manufacturing and selling without let or hindrance from the plaintiffs, they had built up a considerable trade, and had large orders on hand. If the

appeal was not heard soon, their trade would be seriously damaged. He applied for leave to serve short notice of appeal for Monday next.

The MASTER OF THE ROLLS said they would take the case on Tuesday morning, after anything part heard.

Friday, Nov. 9.

Mr. NEILL to-day stated that plaintiffs were advertising in the daily papers the injunction granted by Mr. Justice Day, with these words at the bottom: "Any sale or use of the 'Guaranty' mantles will render all concerned liable to proceedings for contempt of Court for breach of the said order." Under these circumstances, he asked that the order should be suspended over Tuesday. The plaintiffs were also going round to defendants' customers and threatening them, the result of which would be to destroy their trade.

The MASTER OF THE ROLLS: You have an undertaking in damages. The more they ruin your trade, the more the damages will be.

Mr. NEILL said it was a very serious matter to the defendants.

The MASTER OF THE ROLLS: We will grant you an injunction *ex parte* restraining them from doing what you are complaining of now over Tuesday.

Mr. NEILL: And from representing to our customers that mantles in their possession are within the purview of the order of Mr. Justice Day?

The MASTER OF THE ROLLS: Yes. Of course, the defendants will give an undertaking in damages too.

Stealing Gas at Swansea.

At the Swansea Police Court last Thursday, William Evans, of No. 20, Wychtree Street, Morriston, was summoned for wilfully and fraudulently preventing the gas-meter at his residence from registering the correct quantity of gas consumed on the 31st of October. Mr. W. Smith, who prosecuted on behalf of the Swansea Gas Company, said the case against the defendant was a very bad one, and it was necessary that it should be followed up by the Company for their protection. The proceedings were taken under section 38 of the Gas-Works Clauses Amendment Act, 1871; but it was competent for the Company to have made a more serious charge against the defendant. They did not wish to unduly press the case, being only desirous of showing that this fraudulent trick could not be carried on with impunity by dishonest people. Mr. Smith then proceeded to show the Bench, by means of a model, how Evans got his free supply of gas. From the "slot" meter in his possession, the inlet and outlet pipes had been disconnected and some india-rubber tubing employed to join the pipes; and as the gas obtained by this means did not pass through the meter, it was never recorded. On Oct. 31, an inspector of meters called at defendant's residence and found an escape of gas. On removing an old straw hat from the top of the meter, he discovered the cause of the leakage, and also Evans's ingenious plan to defraud the Company. The matter was duly reported to the General Manager (Mr. Thornton Andrews), and Evans admitted his guilt. Mr. Smith called evidence bearing out his statement; and the Bench imposed a fine of £4, inclusive of costs.

Unlawful Use of Water for a Vessel.

At the Bristol Police Court, a few days ago, Charles Lamey, master of the ketch *Cornflower*, was summoned for using, not being a person supplied with water by the Bristol Water Company, water from the pipe of another consumer. Defendant, who was away at sea, was represented by a friend. Mr. E. Gerrish appeared for the Company, and said that Messrs. Durnford, contractors, were engaged on some works on the Grove, Prince Street, and had applied to the Company, and received permission, to take water from a stand pipe for the purposes of their work, at a certain rate. Defendant was the master of a ketch which traded, he believed, between Bristol and Devonshire. The boat arrived in Bristol on the 13th of October; and about 5.30 the next afternoon defendant was seen to take buckets of water from a hose which led from Messrs. Durnford's supply, to the vessel. A constable who was on duty noticed the occurrence, and went to defendant. The latter stated that he had permission to take the water; but he could not have had this unless it was from the Company. They supplied shipping with water at certain rates, and the present prosecution was taken under the Water-Works Clauses Act, 1863, which made defendant liable to a penalty of £5. One of the water police said that at 5.35 on the afternoon of the 14th of October he was on the Grove, and saw defendant on his ketch. There was a small india-rubber hose leading from the pipe of Messrs. Durnford to the vessel. Defendant was filling buckets at his end, and was emptying them into the ship's breakers. Witness spoke about it to Lamey, who said he had the watchman's permission; but the watchman denied having given it. He said he had filled three breakers. Mr. Ernest Abbott, Chief Inspector for the Company, said the defendant was not supplied by them with water, but Messrs. Durnford were. The defendant's representative stated that the vessel had brought in a cargo for Messrs. Durnford, and the crew were working for them in unloading, and he thought they could use the water as workmen for Messrs. Durnford. The Bench fined defendant 20s. and costs, or 21 days.

Further Gas and Water Powers for Mansfield.—The Mansfield Town Council, at a special meeting yesterday week, resolved to promote a Bill in the next session of Parliament for the purpose of making further provision with respect both to the gas and water undertakings, and to sanction the purchase of the works of the Mansfield Woodhouse Gas Company, Limited.

Georgetown (British Guiana) Gas Company.—At the half-yearly meeting of the Georgetown (British Guiana) Gas Company, last Tuesday, the following report of the Directors for the six months to June 30 was, on the motion of the Chairman of the Company (Mr. Charles Gandon), adopted without discussion: The loss on the revenue account amounted to £200 19s. 3d., which has been written off the reserved fund; and there are no funds available for the payment of interest on the debenture bonds, dividends on the share capital, or Directors' fees. The proposals for the sale of the works, referred to at the adjourned meeting in May last, have not, so far, resulted in anything definite; but negotiations are still pending.

MISCELLANEOUS NEWS.

IMPERIAL CONTINENTAL GAS ASSOCIATION.

The Half-Yearly General Meeting was held last Tuesday, at the Cannon Street Hotel, E.C.—Mr. T. H. G. NEWTON in the chair.

The SECRETARY (Mr. R. W. Wilson) read the notice convening the meeting, and also the following report of the Directors:—

The present half-yearly ordinary general meeting of the proprietors has been convened in conformity with the Association's Acts of Parliament, for the purpose of receiving a report from the Directors upon the affairs of the Company, and of declaring a dividend for the half year ended the 30th of June last.

The following summary shows the results of the Association's operations during that period: The quantity of gas made in the half year was 3534 million cubic feet; the quantity made in the corresponding half of 1899 was 4538 million cubic feet—a decrease of 1004 millions.

The decrease in the quantity of gas made at Vienna, owing to the surrender of the entire supply in the inner districts, amounted to 1305 million cubic feet. Therefore, excluding Vienna from the comparison, it will be seen that the other stations of the Association exhibit an increase in the production of gas of 310 million cubic feet—giving an average rate of increase of 10·6 per cent.

The total number of lights on the 30th of June last was 2,258,335; at the close of the corresponding half year, the number of lights, including over 600,000 in the inner districts of Vienna, was 2,651,088—the net decrease being 392,753.

During the half year under review, 27 miles of new mains were laid, making the entire length of mains in use on the 30th of June last 1655 miles; being 303 miles less than on the 30th of June, 1899, when the length of mains was 1958 miles. This figure included 343 miles of mains in the inner districts of Vienna, and 22 miles of mains at Essegg and Neutra, which stations, as the proprietors were informed in the last report, have been transferred to a new Hungarian Company. The number of consumers on the books of the Association on the 30th of June last was 191,445, as compared with 226,014 on the 30th of June, 1899—a decrease of 34,569; the loss of consumers in the inner districts of Vienna being 56,000. The decrease in the sale of gas at Vienna equally affects the receipts for gas and the profit for the half year, both of which exhibit a diminution.

There was an increase in the gross cost of coal of 1s. 6·18d. per ton; but, owing to the improved value of the secondary products—coke, tar, and ammoniacal liquor—the net cost of coal for the half year under review was 6·22d. per ton less than in the corresponding period of 1899.

The plant and mains at all the stations were maintained in a due state of efficiency.

Owing to the large increase in the consumption of gas at nearly all the stations of the Association, considerable expenditure has been incurred for enlargements and extensions.

At Aix-la-Chapelle, where the staff had outgrown the office accommodation, the remodelling and enlargement of the premises in the Jülicherstrasse were taken in hand, and satisfactorily completed. In order to deal with the increased volume of gas produced at this station, a new purifier-house was commenced. The purifiers to be erected therein will be supplied from the disused Erdberg works at Vienna.

At Antwerp, the anticipated increase in the consumption, owing to the considerable reduction made in the price of gas, has been realized; and new purifiers and an installation of water-gas plant of a capacity of 1½ million cubic feet per day are in course of construction.

At Berlin, an additional installation of inclined retorts was commenced on the Gitschinerstrasse works. The installation of hydraulic stoking plant on the Schöneberg works was completed, with satisfactory results.

At Mariendorf, very considerable progress was made with the erection of the new gas-works and new meter manufactory. During the half year under review, it became necessary to lay a considerable length of mains of a large diameter. For this purpose, the Directors have utilized mains taken from the inner districts of Vienna; and a large saving has been thereby effected. In anticipation of the expiration of the Association's lease of the premises in the Leipzigerplatz, used as a show-room, the Directors rented other premises in an equally good position at a much lower rent.

A contract with the Commune of Rudow, a suburb to the south-east of Berlin, was concluded for fifty years—until 1951.

At Brussels, the removal of the offices from the Rue Marcq to the Chaussée d'Ixelles was effected without inconvenience; and material advantage has already resulted from the change. It was decided, as the premises in the Rue Marcq were no longer required for the Association's business, to dispose of them. The increased consumption of gas at this station had almost reached the maximum producing and storage capacity; and it became urgently necessary, to meet the still growing demand, to considerably enlarge the plant. At the Forest works, an installation of water-gas plant of a capacity of a million cubic feet per day was commenced, together with a new set of purifiers of an area of 5400 square feet. At the Koekelberg works, a new retort-house was erected. Hitherto, all the coal required at this works has had to be carted either from the railway or from barges, at a very heavy cost. The Directors have now succeeded in getting a direct connection with the railway, the outlay on account of which will soon be recouped by the saving effected in the cost of transport of the coal delivered on to the works. A piece of land was purchased in the Boulevard Léopold II. in Molenbeek—one of the suburbs supplied by the Association—with a view to the erection thereon of a show-room.

The erection of an electric light station at Woluwe St. Pierre for the supply of the Communes of Woluwe St. Pierre and Auderghem and the Avenue Tervueren was completed. The Directors took advantage of an opportunity of purchasing the electric-lighting works, cables, and concession of the Ixelles Electric Light Company for the sum of £56,000; and the business was transferred to the Association on the 23rd of March last. The Association will supply from this works the whole of the Commune of Ixelles, and also the neighbouring Commune of Molenbeek, where the Association had entered into obligations to supply electric current.

At Flushing, it became necessary, owing to the extension of the works, to provide additional room for the storage of coal; and a piece of land adjoining the works was purchased for this purpose. Progress was made with the new three-lift gasholder; and, at the end of the half year, it was approaching completion.

At Frankfort, to meet the increased demand for gas, additional retort power was provided upon the Bockenheim works. The enlargement of the offices in the Obermainstrasse was completed.

At Vienna, the arrangements for continuing the Association's business in the outer suburbs, with the gas-works situated in these suburbs, were completed. The Directors have made all arrangements for dismantling the works no longer in use; and they have succeeded in making use at their other stations of a large quantity of the plant. They have also sold

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The Brass Plate has holes around its edge, numbered; these indicate the feet delivered for the Coin used To set the Meter, note Figs. I., II., III., IV.

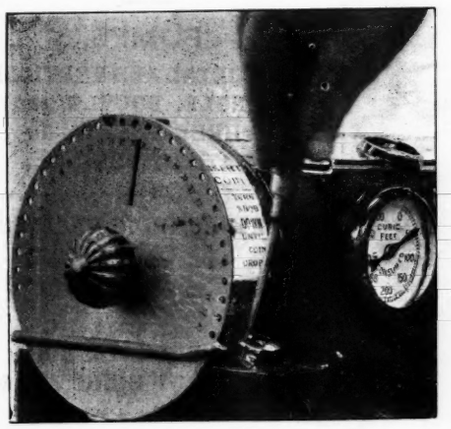

Fig. I.
Break Company's Seal and Remove Screw—THUS.

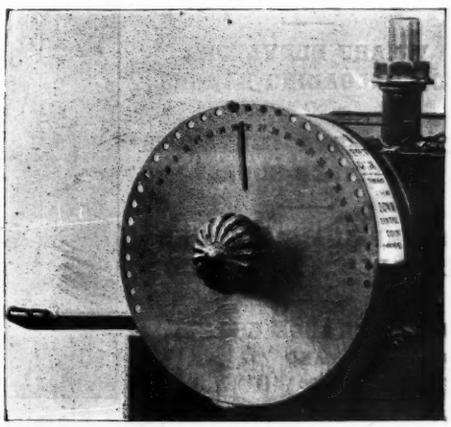

Fig. II.
Swing Band Back—THUS.

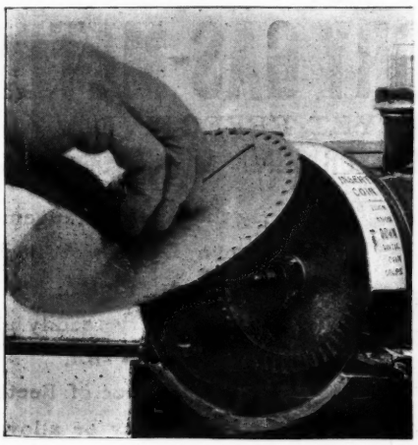

Fig. III.
Lift Plate Off—THUS.

Fig. IV.
Replace Plate—THUS.

Swing Band Forward—Replace Screw—and Re-seal.

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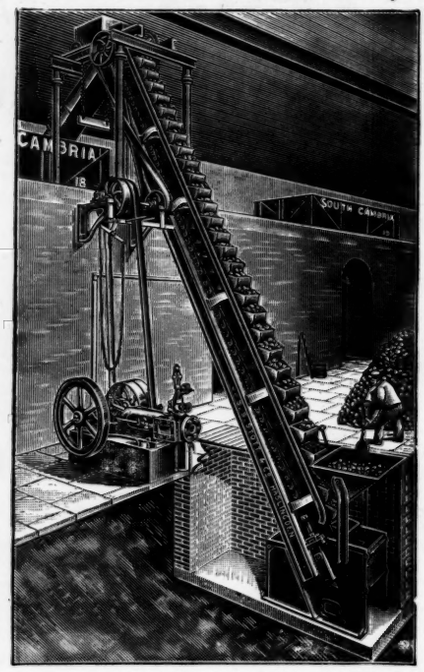

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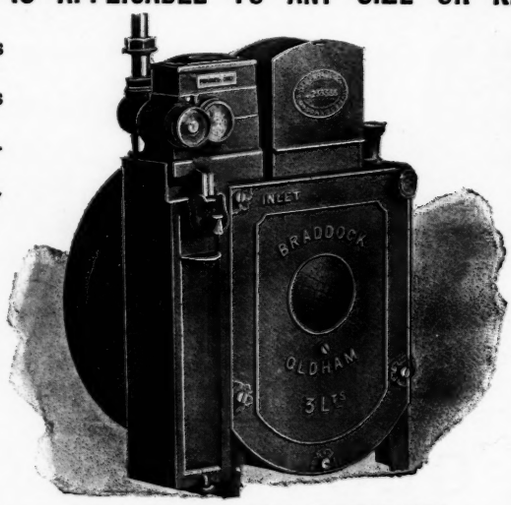

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several plots of land and other property on favourable terms. Considerable extensions have been planned for the Baumgarten works—one of the three works retained for the supply of the outer districts. Extensions were also necessary at Floridsdorf, which is a Commune situated on the north side of the Danube, quite independent of the Vienna Town Authorities. The contract for the supply of gas to Floridsdorf has been extended for a period of thirteen years—until 1919. At the close of the half year, negotiations were in progress for the conclusion of contracts with various neighbouring Communes.

At Komotau, one of the new stations recently acquired in Bohemia, an electric-supply works was completed and put in action.

The Directors desire, in conclusion, to draw the attention of the proprietors to the accounts for the half year ended the 30th of June last. These have been duly audited; and from them the Directors have, in accordance with the provisions of the Companies' Clauses Consolidation Act, prepared a scheme, showing the profit of the Association for the half year, and the portion thereof applicable to the purposes of dividend, which they recommend now to be declared—viz., a dividend of 5 per cent. for the half year ended the 30th of June last, payable free of income-tax, on and after Tuesday, the 13th inst.

The Chairman, in moving the adoption of the report, said that, on no previous occasion had he ever moved, or from the vice-chair had he ever seconded, the adoption of the half-yearly report with more thorough and unqualified satisfaction than, under the circumstances, he did that day; for the proprietors would remember that this was the first occasion on which the Inner City of Vienna had contributed nothing to the profits of the Association, while the dividend recommended was the full dividend of 10 per cent., fairly and squarely earned in the half year, and without recourse to the dividend equalization fund. More on this head he would postpone, and would give now the shortest possible review of the occurrences since the close of the half year. The report referred to the extension of the contract with Floridsdorf until 1919, and stated that, at the end of the half year, negotiations were in progress for the conclusion of contracts with various neighbouring communes on the same bank of the Danube. He was glad to add that, since the close of the half year, three contracts for thirty years each had been concluded with the communes of Bisamberg, Stammersdorf, and Strebersdorf. At the moment, realization of their assets at Vienna was the matter there which most largely had the attention of the Directors; and he was pleased to say that this realization progressed satisfactorily in regard both to plant above ground and below, and to land and houses. Since they began to remove the mains on the 31st of May, considerably more than half of them in value had been taken out; and they had found welcome homes at other stations when not needed at Vienna. This was also true of plant not required for the works at Baumgarten and Floridsdorf; and, as an instance, he might mention that the 200 feet holder at the Tabor works was being re-erected at Berlin, with a saving to the Association of more than £10,000 on what such a holder would have cost them at the present inflated prices of engineering plant. At Berlin, a contract for fifty years was concluded with the suburb of Buckow. The new meter-works at Mariendorf were completed; and already there were calls for their extension. At Brussels, the decision of the Board to sell the premises in the Rue Marcq had been carried into effect. The estimates of the Board at the commencement of the year for extensions and alterations during the year were no less than £350,000 more than they were the previous year. Now as he viewed extensions within the area of their operations, when judiciously made, as a most profitable outlay of capital, this was a matter for sincere congratulation. Though slightly out of order, he might mention here that, in seeking new fields for the employment of the proprietors' capital, the Board had not been without success since the close of the half year, in that they had acquired the contracts for supplying gas to a portion of the City of Prague and the whole of four of its suburbs, with works at Lieben. A feature of special importance and noteworthy in this transaction was that the right to supply gas to private consumers was *in perpetuo*. He might say here that four of the Directors—Mr. Lucas, Sir James Carmichael, Sir Charles Jessel, and Mr. Birchenough—had visited Prague; and he (the Chairman) was satisfied that the prospects of the Association there, when Imperial Continental methods were introduced, would prove satisfactory. Now what was the position in which the Association was left with the loss of the Inner City of Vienna? They learnt from the report that, from this cause, the output of gas had fallen from 4538 million cubic feet to 3534 millions; being a decrease of 1004 million cubic feet, or nearly 23 per cent. on what it was in the corresponding half year when the Inner City of Vienna was included in the accounts. He might tell the proprietors, for the sake of comparison, that their present output was the same as that of the first half of 1888, which, of course, included the output both of Amsterdam and Vienna. The report also stated that the present output was increasing at the rate of 10½ per cent. per annum; and he might supplement the statement by this—that the rate of increase was well reflected in the profits; so that the Association ought to recover what they had lost in output, if not also in profits, in a very few half years, and he did not personally know any reason why they should not do so. Had there been anything abnormal at the moment in the cost of the manufacture or the distribution of gas—as, for instance, in the net cost of coal—this would have been an element which would have at once masked the real position of their future prospects. But, as it was, no one in the room should have any more difficulty than he had in seeing that—greatly due to the prevision of the Directors, and the consequent provision made by them—the prospects of the Association were based on a foundation as secure for the future as they had long been in the past.

Mr. J. Horsley Palmer, in seconding the motion, said there was no doubt the half year had been a critical one for the Directors; and they were most fortunate in being able to place such a report as the present one before the proprietors. Individually, he certainly thought they would have had to draw upon the fund which the proprietors were told was placed on one side after the sale of the Amsterdam works especially as a dividend equalization fund. But so elastic were the operations of this great Association, and so able had been the management of their officers on the Continent, that the profits of the half year not only enabled them to pay a 5 per cent. dividend (after having written off adequate amounts on account of wear and tear at all the stations), but also to carry to the contingency fund upwards of £18,000. When they considered that they had lost such a profitable station as Vienna was, he thought that was a very remarkable result.

Mr. St. John B. Roscoe remarked that it was rather difficult for the proprietors to put questions when they had only just had the accounts read to them. To enable the proprietors to criticize the figures, they ought to have the accounts before them for a day or two; and he asked whether they could not be sent out before the meetings as in the case of most other companies. He also inquired whether, in the case of terminable contracts (which he thought most of their contracts were), a sinking fund was set apart to replace the capital which was expended; so that, at the end of the contract period, the capital thus sunk was not lost, but would be in the coffers of the Association. He believed, in the case of the Vienna contract, it was thought, when the contract was not renewed, that a considerable loss had been caused to the Association by the loss of the capital which had been sunk; and, of course, if a sinking fund had been set aside, such an idea would not have arisen.

Mr. R. S. Gardiner said that, after such a report as had been read, supplemented as it was by the remarks of the Chairman, which must have conveyed to everyone present the extraordinary vitality of this great undertaking, and must have convinced the proprietors of the initiative taken by the Directors in every desirable direction to further and advance the prosperity of the concern, he did think that, from the proprietors' side of the table, there should be at least some slight expression of what must been been a very welcome surprise to find that they had done so remarkably well in this half year, which, if the Association were ever to have a critical half year, would have been the one—viz., the half year in which they were to feel the full effect of the loss of such an important station as Vienna. He wished as an individual proprietor to voice what he could not help thinking must be felt, and must be heartily appreciated, by the proprietors at large—that the management of the undertaking was in such good hands, and that, owing to the wise and prudent manner in which the Board had provided for the one misfortune that had recently befallen the Association, its effects had been minimized, and they were able to look forward to, after a comparatively short space of time, not a disappearing, but an increased prosperity for the undertaking. The proprietors, he felt confident, appreciated to the full the amount of anxiety, time, and care that must have been required in the management of the undertaking, which had become so complex in its many branches, and in the many directions in which the Directors were profitably utilizing the proprietors' money.

The Chairman said that Mr. Gardiner's remarks might be taken as an answer to the question and difficulty of the honourable proprietor who spoke first. He might, however, tell him that he had only to apply at the office of the Association to see the accounts in anticipation of the meeting; but it would not be convenient to adopt the course which he proposed in regard to them. Within the last two or three years, he (the Chairman) had explained at great length the principles on which provision was made for the falling in of stations. The inner district of Vienna was their largest. Under the circumstances, as Mr. Gardiner would well know, it was the most difficult to provide for of any station they had; and he (the Chairman) claimed that they had provided for the falling out of this station in as efficient a way as well could be made.

The motion was unanimously carried.

On the proposition of the Chairman, seconded by Mr. J. Horsley Palmer, a dividend of 5 per cent. was declared for the half year on the £3,800,000 stock, free of income-tax.

A hearty vote of thanks was next passed to the Chairman and Directors on the motion of Mr. Gardiner, seconded by Mr. P. J. Harding.

The Chairman, in responding, assured the proprietors that the vote had never been more deserved than on this occasion. He then moved a vote of thanks to the officers, remarking that gas companies operating in this country could have little idea of how much a Company carrying on business abroad had to thank their official staff for. The Directors might be here, there, and everywhere on the Continent, but they could not be so daily; and they had to leave important matters constantly to their staff abroad. He was always glad to move a vote of thanks to them for their fidelity in the discharge of their duties.

Mr. C. Pigou seconded the motion, which was unanimously agreed to.

This concluded the proceedings.

THE DEVONPORT CORPORATION AND THE GAS-WORKS.

The Proposed Purchase Scheme.

So far as can be seen at present, the proposal that the Devonport Corporation shall promote a Bill next session for the purchase of the undertaking of the Devonport Gas Company is not regarded with much enthusiasm. Few of the candidates at the recent municipal election made any reference to the subject; while the apathy of the general body of ratepayers amounts to positive indifference. All this may be changed when the question actually comes before the Town Council and the ratepayers for their formal assent to the parliamentary proceedings. In the meantime, a significant admission is made in an obviously inspired paragraph which appeared last week in one of the local papers. According to this communication, the principal object of the Corporation in taking steps to purchase the Company's undertaking is to "safeguard the borough's interests in the Company's Bill." The inference is that if the Company are prepared to concede terms which the active spirits of the Corporation regard as satisfactory, the purchase scheme will not be persisted in. This is the more likely because the Corporation have several considerable undertakings on hand, including the erection and equipment of electric light plant; and a number of the ratepayers are already taking fright at the imminent prospect of largely increased rates. On the other hand, there is unquestionably a difficulty over the lighting of the district of St. Budeaux and Pennycross, recently added to the borough. When before Parliament with a Bill for the inclusion of these districts, the Corporation sought to conciliate the opposition by, among other things, undertaking to light the roads and streets. They have not been able to satisfactorily redeem this promise. It has been discovered that electric light is a luxury which cannot be afforded for rural lanes and suburban streets; while the Gas Company declined to undertake the business unless the Corporation would bear the cost of laying the mains, a considerable length of which would be for the present, and probably for many years to come, almost entirely unremunerative. An arrangement which would remove this cause of dissatisfaction would

go far, with many ratepayers and members of the Town Council, to settle the fate of the purchase scheme. That an arrangement is not impracticable is shown by the fact that since the original proposal as to the laying of the mains was rejected, the Company have made more than one offer to meet the Corporation and discuss the subject, and have, in writing and in conversation with representatives of the Corporation, suggested alternative terms upon which the lighting of these suburbs might be undertaken. Mr. A. Bennee, the Chairman of the Company, was interviewed by a representative of one of the newspapers last week, and among other things discussed was this question of the supply of gas to St. Budeaux and Pennycross. He pointed out that in any case the laying of the mains would have to be postponed until the completion of a new bridge, now in course of construction, to give better means of access to St. Budeaux. "When that is done," he said, "the Company will be ready to supply gas on equitable and easy terms. Up to the present," he added, "the Corporation have not really asked what the terms are; but there is no suggestion that a penny more shall be charged than is charged in the old portion of the borough."

Of course, there are other questions which are likely to arise between the Company and the Corporation, in the event of a parliamentary fight. The matter of the street lighting, which the Corporation wish to take into their own hands with a view to the adoption of the incandescent system throughout the town, appears capable of adjustment. The lamps are now the property of the Company, and the lighting and maintenance are undertaken by them at an inclusive annual charge per lamp. Mr. Bennee has publicly stated that the Company have no objection to the transfer of the lamps and the lighting to the Corporation; and the heads of an agreement for this purpose have already been arranged. As regards the financial proposals of the Company, it is too early yet to say anything. In the local papers there has been much criticism of the Company, some of it based on misconceptions, while the rest appears to have for its object the depreciation of the property in the hope of thereby aiding the municipalization project. In the speech reported in the "JOURNAL" last week (p. 1157), Mr. Bennee replied to some of this criticism. Further explanation was given a few days ago in the interview to which reference has already been made. One of the charges brought against the Company was that the cost of the extension of the works has been placed to revenue instead of to capital account. It is 56 years since the Company obtained their Act of Parliament; and as no increase of the capital has been sought since then, the inference seems to have been drawn, at a venture, that the works were being added to at the expense of the consumers. Mr. Bennee gives this charge an emphatic denial, and, moreover, says that there are arrears of dividends amounting to £60,000 which the shareholders have not drawn. Until within the last few years, Devonport has grown very slowly; and Mr. Bennee contends that, independently of the arrears of dividends, the Company have spent nothing more upon plant than was perfectly justifiable. That the policy of the Company has not been detrimental to the consumers is, he says, proved by the fact that there is only one town west of Bristol in which gas is sold at a cheaper rate than in Devonport. On the subject of municipalization, Mr. Bennee naturally takes a strong line. In his opinion, the town is getting into a woful financial mess. He told his interviewer that it would really be an act of charity to the gas consumers to prevent the town acquiring the undertaking. The price the Corporation would have to pay would be such that they could make no profit for many years. They only wished to have the undertaking as something to fall back on. They would bleed the gas consumers when they wanted money; they would look on it as a nest from which they could extract eggs to pay for any extravagance of their own. He noticed that Mr. Bellamy had advised the Corporation. If municipalization was so good for Devonport, why not for Liverpool with her great means? Had Mr. Bellamy given the same advice to Liverpool? And why had not Plymouth done it, and Torquay, Brighton, Exeter, or Bristol? These Corporations were at least as progressive as that of Devonport. They had an example in Devonshire of the other plan, for at Teignmouth the gas was supplied by the town, and there, apart from the high cost, they had a state of indebtedness gradually getting worse.

In this manner Mr. Bennee carries the war into the opposition camp. The Devonport Gas Company have, he says, no intention of meekly losing their business, which is now more prosperous than ever; and certainly there is no sign of meekness or surrender in the attitude of the Chairman. Indeed, the Company have already made their arrangements for meeting the expected attack in the Parliamentary Committee-rooms; and Mr. Balfour Browne, Q.C., Mr. George Livesey, and Mr. Corbet Woodall are to be among those who will appear in their behalf. The latest proposal from the Corporation has taken the form of a request that permission may be given to experts appointed by the Corporation to inspect the Company's works, and examine their accounts for the past ten years, with a view to enabling the Town Council to make an offer to purchase the undertaking on the basis of converting the dividends into annuities for the shareholders. It is considered improbable that the Company will listen to this or any other offer for the purchase of the works.

GAS AND WATER SUPPLY OF SOUTHPORT AND BIRKDALE.

At the Meeting of the Birkdale District Council last Tuesday, Mr. Wells, in accordance with notice, moved—"That the Clerk be instructed to write to the Southport Corporation to ask upon what terms and conditions they would be willing to cease the supply of gas to Birkdale after due notice—to expire (say) five or seven years hence." Before doing so formally, he proceeded to give a few particulars in reference to the gas supply of Birkdale. He explained that in 1865 the Southport people had gas-works of their own, and applied for powers to supply gas within a six-mile radius. Birkdale opposed this application, and, under the Public Health Act, obtained powers to lay down their own mains—Southport agreeing to supply gas at a certain price for three years. In the meantime it was the intention of Birkdale to erect gas-works of their own; and a Company was formed for the purpose. In 1870, Southport applied for parliamentary powers to buy up the Birkdale mains, and practically to absorb Birkdale in that particular matter. The Local Board successfully opposed it; and at the same time obtained a Provisional Order to erect gas-works. In some way or another, this fell through. An agreement was entered into between the Directors of the Company to the effect that if Birkdale would not go in for gas-works of their own, and would let their Provisional Order drop, Southport would supply them with gas under a co-operative arrangement on equal terms with themselves. This arrangement was continued until 1881, when gas was supplied to the district at exactly the same price as it was to the Southport customers. He afterwards went on to explain the provisions of subsequent Acts in reference to the right of Birkdale to lay their own mains; Southport paying them 4½d. per 1000 cubic feet on all gas supplied to private consumers for the privilege of the supply. In 1873, the maximum price was raised to 4s., and the illuminating power was lowered from 20 to 18 candle power for three years. This, he believed, was principally owing to the high price of coal at that time. The illuminating power still remained at 18 candles. In 1876, Southport again sought powers to include Birkdale, and to increase the maximum price to 4s. 6d. per 1000 cubic feet; and owing to this, they were allowed to make as much profit as they could, if the price did not exceed 4s. 6d. The gas question had been a sore point with them for a number of years; and the secret of the whole thing could be traced very easily. Southport might want to convey their gas through Birkdale to Ainsdale; and, of course, if they wished to do this through the Birkdale mains, it was their duty to increase the size of them, and to pay for it. In 1895, they laid a trunk pipe-line which gave Birkdale another good supply; and up to the present they had had all they required, if the illuminating power was equally good with the pressure. Mr. Bellamy's latest test showed a power of over 20 candles; and this, they all agreed, was very satisfactory. In reference to price, he pointed out that Southport had made a profit of £16,256, which was equal to 11d. per 1000 cubic feet of the gas sold, or 1s. 2d. in the pound off the rates in Southport. Birkdale contributed one-sixth of this sum, or, in other words, £2700 a year. He thought the time had now come when they should consider the question of providing their own gas, which they could manufacture at 2s. per 1000 cubic feet, with as good an illuminating power as they had at present. They would also have a considerable profit from the undertaking.

The motion was carried.

Subsequently, the meeting was made special, when the following resolution was submitted: "That the Council approve and confirm, or otherwise, the minutes of the General Purposes Committee of Oct. 17, 1900, containing the report of the Sub-Committee appointed by the Council, for promoting a Bill in Parliament constituting a Joint Water Board for Southport, Birkdale, and the West Lancashire rural district, and to acquire the undertaking of the Southport Water-Works Company, on the basis of the Sub-Committee's report." Mr. Hughes moved an amendment to the effect that the minutes be not approved, inasmuch as, when that Council succeeded, with the Southport Corporation and the West Lancashire Rural District Council, in Parliament, early this year, in causing clause 28 to be inserted in the Southport Water Act, 1900, the understanding was that the three Councils—viz., Southport, Birkdale, and the West Lancashire Rural District—were to join in promoting a Bill for constituting a Joint Water Board, with mutual responsibilities to acquire the undertaking of the Southport Water-Works Company; and the appointment of the Birkdale Council's Sub-Committee to confer with the Committees of the two other Councils was on the basis of this understanding. Further, that, inasmuch as the West Lancashire Rural District Council had withdrawn from any liabilities of such Board, if and when constituted, and sought to obtain representation thereon with special advantages as to water supply in their district, and to be recouped by Southport and Birkdale any costs they might incur in promoting the Bill should it be rejected, the Birkdale Council declined to promote the Bill, or to proceed further in the matter of the formation of the Board on the basis proposed in the report. In moving the amendment, he read the clause in reference to the promotion of the Board. It set forth that if the Board purchased the undertaking, the arbitrators or the umpire should determine the sum to be paid by the Board to the Company, not taking into account the powers of the Company to raise additional capital under the provisions of the Act, except in so far as money that should at the time of transfer have been actually expended by the Company on work was concerned. He objected to the action of the Southport Corporation in going behind the backs of Birkdale to make an agreement with the West Lancashire Council, and also to that Council being admitted to representation on the Board without responsibility or liability; and he said that, although he was agreeable that there should be a Joint Board, it must be based on equitable lines. Mr. Davey seconded the amendment. After some discussion, the Law Clerk pointed out that if the amendment was carried it would not prevent the Committee from attending the meeting of the Board the next day, and trying to come to some arrangement. It was thereupon carried unanimously.

On the same evening, a meeting of ratepayers was held in the Cambridge Hall, Southport—the Mayor (Alderman Griffiths) presiding—for the purpose of passing a resolution authorizing the Town Council to proceed with a Bill in the ensuing session for the purchase of the undertaking of the Southport Water Company, conjointly with the Birkdale Urban District Council and the West Lancashire Rural District Council, or either, and the formation of a Joint Water Board. The Mayor moved the formal resolution, and said he believed the ratepayers of Southport were unanimous in their approval of the proposal to acquire control over the water supply. He pointed out that, should any disagreement occur, Southport would have power to proceed either alone or with only one of the other Authorities interested. The motion was seconded by Mr. Hulme, who said he was sure it would be to the interest of the borough that they should have the water supply in their own hands. The Very Rev. Dean Cahill asked if the scheme would involve any considerable increase to the rates. The Mayor said they could not tell until they knew the price they would have to pay; but he was hopeful that it would not. They must remember they were proposing to purchase a valuable undertaking, and they would have to be prepared to deal fairly and equitably with the shareholders. Should any loss occur on the first few years' working, he hoped Parliament would allow them to meet it from the profits of succeeding years; after which he trusted they would be able to reduce the charges. The motion was carried unanimously.

The Walker and Wallsend Union Gas Company have decided to call up all their unissued electric lighting capital, and raise £25,000 of the additional capital sanctioned by their Act of last session.

THE PROPOSED EXTENSION OF THE CARLISLE GAS-WORKS.

The Gas Committee to Reconsider the Matter.

At the Meeting of the Carlisle Corporation last Tuesday, the Gas Committee reported that they had considered the recommendations of their Engineer (Mr. C. B. Newton) and of Mr. Corbet Woodall upon the proposed extension of the gas-works plant (*ante*, p. 965) and had come to the conclusion that, instead of introducing water gas, the coal-gas manufacturing plant should be extended upon Boustead's Grassing. Mr. Newton estimated that the cost of these extensions would be £33,000. The Chairman of the Committee (Mr. Corbett) moved the adoption of their recommendation, which it appeared had been carried by a majority of one. He said he had been one of a deputation who had visited towns in which water gas was used, and though he had been pleased with what he had seen, yet the adoption of water gas would be beset with many risks. It was said to be somewhat dangerous to health; sanction to borrow the money to meet the cost could not be obtained from the Local Government Board; and if they spent £13,000 upon its introduction, they would at the end of five years be bound to spend £33,000 upon the extension of the coal-gas plant. He confessed that he had at first thought that a small installation of water-gas plant would have tided them over the present difficulty; but seeing that it would not suffice for more than two years, he could not support a proposal to have an installation of the kind. If they put down, as the Committee had proposed, plant to make 500,000 cubic feet of coal gas per day at a cost of £33,000, they would be in a position to double the output at an expenditure of £5000. So that they would be able, at a cost of £38,000, to produce a million cubic feet of coal gas per day. This was £8000 less than would be necessary for about the same quantity of gas something like half of which would be water gas. They would also be able to borrow the capital required; and provision could be made for further extensions. Mr. R. Foster seconded the motion. Mr. Collin regretted that the Committee had come before them with divided opinions. The Council should almost refuse to vote on so great a scheme until the Committee were unanimous. The manufacture of coal gas could not be increased upon the present site, and that at Boustead's Grassing was impossible, because it would soon be the centre of much residential property. Let them, therefore, adopt the simple, easy, and direct plan of mixing the gases and look out for a new site. Mr. Phillips moved, as an amendment, that the question be referred back to the Committee for one month, to see whether they could not come nearer unanimity. Mr. Atkinson seconded the amendment; remarking that the Committee seemed to be at sixes and sevens with regard to everything. Mr. Lightfoot opposed the adoption of the Boustead's Grassing site, and expressed his intention of moving an amendment to this effect. He said the conduct of the Committee was becoming a scandal to the city, and he had felt inclined to move that, having forfeited the respect of the Council and the city, they be respectfully requested to retire. Mr. Phillips said he would accept Mr. Lightfoot's amendment as to the unsuitability of Boustead's Grassing as an addition to his own. In the course of further discussion, this site was generally condemned; and Mr. Phillips's amendment, on being put to the meeting, was carried.

SALES OF STOCKS AND SHARES.

At the Mart, Tokenhouse Yard, last Tuesday, Mr. Alfred Richards conducted a sale of gas and water stocks and shares. The first lots offered consisted of a new issue, by the Directors of the Ilford Gas Company, of £5000 of "C" stock, ranking for a standard dividend of 5 per cent., subject to the sliding-scale, and entitled, in view of the dividends paid by the Company since 1897, to 6 per cent. per annum. It was sold at £105 and £105 10s. per £100 of stock. A small quantity of 5 per cent. preference stock of the Brentford Gas Company was next offered, and was sold at £134 per cent., *cum div.* from the 1st of July last. A new issue of £3000 of 4 per cent. perpetual debenture stock of the Epsom and Ewell Gas Company was placed at £97 10s. per £100. Some £20 fully-paid shares in the British Gaslight Company, Limited (last dividend 10 per cent.), fetched £28 apiece. A parcel of fully-paid £5 shares in the Goring and Streatley District Gas and Water Company, Limited, fetched £2 each. Some £5 shares in the East Cowes Gas Company (£1 paid) realized £2 5s. per share. The last lots submitted consisted of "D" water and gas stocks of the Barnet District Gas and Water Company, which fetched £140 per £100 of stock. The following day, Mr. J. R. Tait, of Rugby, carried out the instructions of the Executors and Trustees of the late Mr. Peter Simpson to offer for sale a plot of freehold land and a number of shares, the estate of the deceased. Some £10 shares in the Alliance and Dublin Consumers' Gas Company fetched £19 10s. each; £285 original stock in the Great Wigston Gas Company, £441 10s.; £350 new ordinary stock in the same Company, £393 18s.; 20 £10 6 per cent. "C" preference shares in the Aldershot Gas and Water Company, £13 17s. 6d. per share; 10 do., £13 10s.; 30 £10 shares (fully paid) in the Newent Gas Company, £8 10s. per share; eight 4 per cent. mortgage debentures of £50 each in the same Company, £49 15s. and £50 per share; six £20 shares (fully paid) in the Monte Video Gas Company, Limited, £9 each; 12 £20 5 per cent. debenture bonds in the same Company, £16; 38 £10 shares (fully paid) in the Rugby Gas Company, £30 15s. and £31 per share; 62 do. (£8 10s. paid), £26, £26 10s., and £27 per share. On the same occasion, 24 £3 fully-paid shares in the Southam Gas Company were sold for 49s. each. Last Wednesday, at the offices of the Newcastle and Gateshead Gas Company, Mr. Robert Mack offered for sale £25,000 of the ordinary stock of the Company. It ranks for a standard dividend of 7 per cent., subject to the sliding-scale, under which, while the price shall remain at 2s. 3d. per 1000 cubic feet, the authorized rate of dividend payable will be 8½ per cent. per annum. The stock was put up in £100 lots, and realized prices ranging from £206 5s. to £209 each; the total amount produced being £51,801 5s., or an average of £207 4s. 1d. On the 5th inst., 19 shares of £10 each in the Huntingdon and Godmanchester Gas Company were submitted to public auction by Messrs. Dilley and Son, and realized from £19 10s. to £21 5s. per share. Last Thursday, Messrs. Alexander, Daniel, and Co. sold by auction, at Bristol, £15,000 of Bristol water-works 7 per cent. maximum consolidated ordinary stock. The highest price for £100 of stock (reserve £160) was £165; the lowest, £164—the average working out at £164 4s. The total amount realized was £24,630. At a sale recently conducted by Messrs. Clowes and Nash, at Norwich, 30 shares of £20 each, fully paid, in the British Gaslight Company, Limited, with the accruing half-year's dividends, were disposed of for £39 and £39 15s. each. Some ordinary shares of £10 each, fully paid, in the Norwich Water Company, with the accruing half-year's dividends, were sold at prices ranging from £17 to £17 10s. apiece. Some 3½ per cent. perpetual debenture stock was sold at the rate of £108 per cent. Messrs. Beaumont and Glover, of Wakefield, lately sold £100 of original 5 per cent. stock (1852) of the Barnsley Gas Company for £190. At a sale at Leicester last Tuesday week, thirty £5 fully-paid shares in the Ibstock Gas Company, Limited, realized par value. At a sale of miscellaneous shares at Leeds the same day, some £5 shares in the Mirfield Gas Company realized £12 16s. each.

REGULATION OF LONDON STREETS.

The Opening of Roads by Gas, Water, and Electric Light Companies.

The Conference convened in June last by the London County Council with representatives of the City Corporation and Vestries and District Boards of the Metropolis, with reference to regulations in connection with streets and street traffic, was resumed at the County Hall, Spring Gardens, last Wednesday—Mr. W. H. Dickinson, the Chairman of the Council, presiding. The Committee appointed at the conference held on the 29th of June (*ante*, p. 36) reported as follows: "Several Local Authorities have urged that some remedy should be found for the frequent opening up of public ways by water, gas, electric light, and telephone companies. We consider that this constitutes a great evil, and is the occasion of much annoyance to the public generally, and frequently of loss to tradespeople, and therefore should, as far as possible, be prevented. We suggest that the Local Authorities should have more power of control, and that subways should be constructed, when practicable, under the streets, in which the pipes, &c., could be laid. We accordingly recommend—'That the conference do express the opinion that in all new leading thoroughfares subways should be constructed in which the water and gas mains, pipes, &c., could be placed.'" Mr. H. Clarke asked the members to permit him to incorporate the following with what they had passed at their former meeting: "That this meeting is of opinion that the time has arrived for concerted action on the part of the Local Authorities of the Metropolis to remedy the inconvenience, annoyance, and loss of time and money now caused by the operations of the gas, water, telephone, and electric lighting companies, in laying down, renewing, maintaining, and repairing their mains, pipes, services, and wires." The Chairman thought they had better take the recommendation of the Committee first, and then have a separate motion. The recommendation was accordingly put and agreed to. Mr. Clarke explained that his motion was moved by a member on the previous occasion, and it appeared to have miscarried. He then formally moved it. Mr. R. A. Robinson seconded the motion; remarking that it was really the Local Authorities who should endeavour to have more control over the Gas and Water Companies in breaking up roads at inconvenient times. Mr. W. N. Blair (Surveyor to the St. Pancras Vestry) said it seemed to him that they would get no farther by passing the resolution, unless they stipulated that the statutory powers of the Companies be restricted or put under regulations made by the Local Authorities. All the Companies had power to open the roads. Some were restricted by statute to do this in certain months in the year, and in all cases they were required to give notice to the Local Authority. The Chairman then put the motion, and it was carried by 7 votes to 5.

A CRITICISM OF AN ELECTRICAL ENGINEER'S ESTIMATES BY A GAS ENGINEER.

In 1897, the Bridgwater Corporation obtained a Provisional Order for electric lighting; and they were advised by Mr. W. H. Trentham. After considerable agitation throughout the town, the Council came to the conclusion, by a very narrow majority, to apply for £20,000 to carry out a scheme. The result was a Local Government Board inquiry last Friday week by Colonel A. C. Hepper, who was deluged with a mass of evidence sufficient for a scheme of a more pretentious character. There was great opposition; and no less than three barristers were engaged. Mr. F. E. Weatherly supported the application, Mr. Holman Gregory represented the significant number of 900 opposing ratepayers, and Mr. Honoratus Lloyd was entrusted with the defence of the Gas Company's interests, in conjunction with Mr. W. A. M'Intosh Valon, who had been consulted by the Company. We have not room to follow the large bulk of evidence tendered both for and against the scheme; but the opposition was particularly keen. The interesting part about the evidence was the dexterous way in which Mr. Valon handled Mr. Trentham's figures; and if we give the substance of his evidence, it will serve the two-fold purpose of conveying information about the scheme and about its criticism. One of the contentions of the Company's Counsel was that it would be an injustice to take from them the revenue from public lighting, and at the same time render them liable to contribute substantially to any deficit which might occur on the electric light undertaking.

In the first place, Mr. Valon set himself to prove that Mr. Trentham's original estimate of £14,248 for the installation should be increased to £21,657 according to the tenders received, and that it should be further raised to (say) £25,000 to cover the work proposed to be done. The cost of the buildings Mr. Trentham put at £1400, which Mr. Valon (who hereafter we will call the witness) considered should be at least £2500, having himself allowed £3500 for a similar works; Mr. Trentham estimated for two steam-boilers, two steam-dynamos, steam and exhaust pipes, and feed heaters. These he bracketed together, and put against them an aggregate sum of £4000. The tenders against this, however, were boilers £2498, and dynamos £2944. It seemed to witness that no allowance was made for steam and exhaust pipes and feed heaters. Unless this had been included with the boilers, he calculated that an additional sum of £500 would have to be added. The next item in

Mr. Trentham's estimate was £1540 for booster, switchboard, battery, and crane. The price proposed to be accepted for the switchboard was £538, for the battery £966, and for the crane £149—together £1653. To this Mr. Valon added the cost of the booster (say) £750, which raised the estimate of £1540 to £2403. Private consumers' mains and connections Mr. Trentham estimated at £1117; but witness put it at £1500. The next item in the estimate was for public arc and street lamps and mains, only £5191. The lowest tender received for this was £8302 out of nine competitors—the highest being £11,564. Mr. Trentham, however, proposed to further lower the £8302 by reducing the size of the feeders for public lighting, and placing the cables in creosoted wooden troughing, instead of being armoured; and he generously suggested that the Gas Company should be invited to sell their lamp-posts at 20s. each, so as to permit of a still further deduction from his estimate—bringing the £8302 down to £7070. Witness did not take any of these matters into consideration, as he regarded some of them were problematical; and the £8302 was certainly not more than sufficient to lay down mains in a proper manner and of proper size, and to provide the necessary attachments for the work proposed to be done. Witness therefore thought the cost of the installation, estimated by Mr. Trentham at £14,248, should fairly be raised to £21,657; and this without making any allowance for contingencies.

Coming to the estimated profit and loss account, Mr. Valon stated that Mr. Trentham placed the cost of coal at 0·6d. per unit, or £290. On reference to surrounding towns before the rise in the price of coal, witness found the average cost per unit was 1d. The £290 would therefore have to be increased to £486 16s. 11d. Oil and waste, Mr. Trentham took at £42. The average of the towns referred to was 0·19d. per unit, or £91 2s. 8d. Mr. Trentham put the driver, stoker, man and lad, and supervision at £373. In the towns mentioned, witness found that the average of wages for workmen, management salaries, and general establishment charges (which were not included by Mr. Trentham) came to 1·15d. per unit, or £559 17s. 5d. Witness took this figure; but, in his opinion, it should be considerably increased, seeing that the works, if started, would be a considerable time before they got into full swing; and beyond this fact the smallness of the concern increased in proportion the cost per unit. Repair and maintenance, at 2 per cent. on the increased capital outlay, would amount to £402 14s. 4d., instead of £290. Then Mr. Trentham did not add anything in his estimate for rates and taxes; but Mr. Valon supplied the deficiency by adding 0·1d. per unit, or £48 13s. 8d. The total therefore of witness's estimated expenditure was £1743 5s., to which had to be added interest and sinking fund on capital outlay, which he took at the same rate as Mr. Trentham—viz., 25 years at 5¾ per cent., or £1245 5s. 6d. The annual charge was £2988 10s. 6d., which equalled 6·2d. per unit—certainly not a high estimate. The receipts, as shown by Mr. Trentham's report, were: Revenue from private lighting, 47,600 units, at 4½d., £892, and for public lighting £1100. This amount of £1100 was equal to 3·88d. per unit on 68,043 units. The total number of units between public and private lighting came to 115,643. Meter-rents were calculated at £34—making the total receipts £2026. Witness showed that the increased expenditure would create a deficiency of £962 10s. 6d. per annum, instead of a balance of profit shown in Mr. Trentham's statement of £43, which was more than wiped out by the omission of rates and taxes. The price of current had been put by Mr. Trentham at 4½d. per unit for private lighting. If this were raised to 6d. per unit, the additional revenue would be £297 6s. 8d.; and this was the only amount he could legitimately add to his receipts by increasing the price per unit to 6d. If the public lighting was correspondingly increased, then, in witness's view, it was clear that the additional amount so paid must be a charge against the rates. It was therefore plain that the deficiency of £962 10s. 6d. could only be reduced by £297 6s. 8d. by increasing the cost of current to 6d. per unit—bringing down the deficiency to £665 3s. 10d. But this deficiency would, for some long time, be considerably more than this—that was to say, until such time as the whole of the works now proposed to be put down by Mr. Trentham came into full use, which, in any case, would be a matter of years. Witness knew of no single electricity works in any town of the size of Bridgwater which had been working for three years and showed a profit; nor did Mr. Trentham give any information as to the situation of such towns—the works mentioned by him being mostly large places, such as Manchester and Liverpool.

Proceeding to deal with the question of public lighting, Mr. Valon stated that he found Mr. Trentham depended mainly on this to give him the greater part of his receipts as against expenditure—the report allocating to private lighting 47,600 units, and to public lighting 68,043 units. Witness thought the latter should not be depended upon as a reliable income to cover the expenditure and the instalment of electric light; and he went further by stating that the substitution of electricity for gas would be a retrograde movement, and one totally against the present experience of lighting authorities throughout the country. Mr. Valon called to mind what had taken place at Liverpool, Birkenhead, Newcastle-upon-Tyne, Bradford, Huddersfield, and Tunbridge Wells, and to Sir William Preece's recent advice against the substitution of incandescent gas lighting by electric glow lamps at Maidstone. The cost of two 8-candle power burners in each lamp at Bridgwater, with a mean power of 14 candles, would be for electricity, at 4½d. per unit, together with lamp renewals, cleaning, repairing, &c., £4 15s., as against which Mr. Valon states the Gas Company offered to provide "C" Welsbach burners with a mean power of 50 candles for the sum of £3 2s. inclusive. Incandescent gas lighting could therefore be supplied in Bridgwater at less than two-thirds the cost of electricity, with the additional advantage of obtaining nearly four times the illuminating power. Much more of interest was put forward by witness; but what we have stated here is sufficient to show how completely he was able to prove the unsoundness of Mr. Trentham's estimates, and the different complexion his revised figures placed upon the scheme. The criticism may be useful in similar cases.

The Epsom District Council have resolved to apply to the Local Government Board for sanction to the borrowing of £2000 to meet the cost of water-works improvements.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 1198.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment	Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	**GAS COMPANIES.**			£ s. d.	£			p. c.	**GAS COMPANIES.**			£ s. d.
590,000	10	Oct. 12	10½	Alliance & Dublin 10 p. c.	19—20	..	5 5 0	60,000	5	Sept. 28	7	Ottoman, Ltd. . . .	5—5½	..	6 7 3
100,000	10	,,	7½	Do. 7 p. c.	18—14	..	5 7 2	500,000	100	June 1	6	People's Gas } 2nd Mtg. of Chicago } Bonds .	102—106	..	5 13 2
800,000	100	July 2	5	Australian 5 p. c. Deb. .	101—103	..	4 17 1								
200,000	5	May 16	6	Bombay, Ltd. . . .	6—6½	..	4 12 4	851,070	10	Oct. 12	7	River Plate Ord. . . .	10½—10⅝	..	6 10 3
40,000	5	,,	6	Do. New, £4 paid .	4—4½	..	5 6 8	250,000	Stk.	June 28	4	Do. 4 p. c. Deb. .	99—101	..	3 19 3
380,000	Stk.	Aug. 15	12	Brentford Consolidated	245—255	..	4 14 1	250,000	10	Sept. 28	8	San Paulo, Ltd. . . .	11—12	..	6 13 4
270,000	,,	,,	9	Do. New . . .	177—182	..	4 18 11	185,000	Stk.	Sept. 14	10	Sheffield A.	234—239	..	4 3 8
50,000	,,	,,	5	Do. 5 p. c. Pref. .	137—142	..	3 10 5	209,700	,,	,,	10	Do. B.	234—239	..	4 3 8
159,375	,,	June 14	4	Do. 4 p. c. Deb. .	116—120	..	3 6 8	447,427	,,	,,	10	Do. C.	232—237	..	4 4 5
220,000	Stk.	Sept. 14	10	Brighton & Hove Orig. .	220—230	..	4 6 11	5,641,885	Stk.	Aug. 15	5½	South Metrop., 4 p.c. Ord.	127—130	−1½	4 2 0
226,890	,,	,,	7	Do. A. Ord. Stk. .	150—160	..	4 7 6	1,520,000	,,	July 12	3	Do. 3 p. c. Deb. . .	94—97	..	3 1 10
1,009,500	Stk.	Aug. 29	5	Bristol, 5 p. c. max. .	117—118	..	4 4 9	380,940	Stk.	May 16	5	Southampton Ord. . .	110—115	..	4 6 11
420,000	20	Sept. 28	10	British	37—39	−2	5 2 7	70,825	,,	July 12	4	Do. 4 p.c. Deb.	117—122	..	3 5 7
50,000	10	Aug. 15	12	Bromley, Ord. 10 p. c. .	24—26	..	4 12 4	120,000	Stk.	Aug. 30	6	Tottenham and Edmonton } A. 5 p.c. B. 3½ p.c. 4 p. c. Deb.	112—117	..	5 2 7
79,000	10	,,	9	Do. 7 p. c. . . .	19—21	..	4 5 8	250,520	,,	,,	4½		80—85	..	5 5 11
500,000	10	Oct. 12	6	Buenos Ayres (New) Ltd.	81—83	..	6 17 2	61,550	,,	June 14	4		111—115	..	3 9 7
220,000	Stk.	June 14	4	Do. 4 p. c. Deb. .	98—100	..	4 0 0	182,880	10	Jan. 12	5	Tuscan, Ltd.	7—8	..	6 5 0
150,000	20	July 12	8½	Cagliari, Ltd. . . .	23—25	..	6 12 0	149,900	10	July 2	5	Do. 5 p. c. Deb. Red.	98—102	..	4 18 0
100,000	10	Sept. 28	8	Cape Town & Dis., Ltd.	13½—14½	..	5 10 4								
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	53—55*	..	5 9 1								
550,000	Stk.	Oct 12	12½	Commercial Old Stock .	265—275	..	4 12 8								
236,425	,,	,,	9½	Do. New do. .	200—210	..	4 12 10								
288,287	,,	June 14	4½	Do. 4½ p. c. Deb. .	133—138	..	3 5 8								
800,000	Stk.	May 31	9	Continental Union, Ltd.	175—180	..	5 0 0					**WATER COMPANIES.**			
200,000	,,	,,	7	Do. 7 p. c. Pref. .	170—175	..	4 0 0	780,404	Stk.	June 28	11	Chelsea, Ord.	303—308	+1	3 11 5
51,600	Stk.	—	14	Croydon A 10 p. c. . .	—	..	—	150,000	,,	,,	5	Do. 5 p. c. Pref. .	157—162	+2	3 1 9
178,400	,,	—	11	Do. B 7 p. c. . .	—	..	—	160,000	,,	,,	4½	Do. 4½ p. c. Pref. 75	143—148	..	3 0 10
555,000	Stk.	Aug. 15	5½	Crystal Palace Ord. 5 p.c.	117—122	..	4 6 1	175,785	,,	Sept. 28	4½	Do. 4½ p. c. Deb. .	143—148	..	3 0 10
60,000	,,	,,	5	Do. 5 p. c. Pref. .	130—135	..	3 14 1	1,720,560	Stk.	Oct. 12	7	East London, Ord. . .	198—198	−2	3 10 8
486,090	10	July 27	11	European, Ltd. . . .	19—20	..	5 10 0	654,740	,,	June 14	4½	Do. 4½ p. c. Deb. .	147—152	..	2 19 3
854,060	10	,,	11	Do. £7 10s. paid .	14—15	..	5 10 0	797,687	,,	,,	3	Do. 3 p. c. Deb. .	98—100	..	3 0 0
14,993,075	Stk.	Aug. 15	4⅛	Gas-light and Coke } 4 p. c. Ord. . . 3½ p. c. max. . 4 p. c. Con. Pref. 3 p. c. Con. Deb.	98—100	..	4 8 0	700,000	50	June 14	8†	Grand Junction } 10 p. c. max. . 4 p. c. Deb. .	110—113	+1½	3 10 10
2,600,000	,,	,,	3½		92—94	..	3 14 6	810,000	Stk.	Sept. 28	4		130—135	..	2 19 3
3,799,735	,,	,,	4		114—117	..	3 8 5	708,000	Stk.	Aug. 30	14	Kent	300—305	..	4 11 10
3,998,975	,,	June 14	3		94—96	..	3 2 6	160,000	,,	,,	7	Do. New, 7 p. c. max. .	200—210	..	3 6 8
70,000	10	Oct. 26	8	Hongkong & China, Ltd.	13—14*	..	5 14 4	1,043,800	100	June 28	10½	Lambeth, 10 p. c. max. .	293—298	+1	3 10 6
3,800,000	Stk.	May 16	10	Imperial Continental .	207—212	−1	4 14 4	406,200	100	,,	8	Do. 7½ p. c. max. .	205—210	..	3 16 2
478,600	Stk.	Aug. 15	8½	Do. 8½ p. c. Deb. Red.	100—102	..	3 8 8	350,000	Stk.	Sept. 28	4	Do. 4 p. c. Deb. .	127—130	..	3 1 7
75,000	5	June 14	6	Malta & Medn., Ltd. .	4⅜—5½	..	5 14 3	500,000	100	Aug. 15	14	New River, New Shares	407—412	−1	3 8 0
360,000	100	Oct. 1	5	Met. of } 5 p. c. Deb.	105—108	..	4 12 7	1,000,000	Stk.	July 27	4	Do. 4 p. c. Deb. .	128—133	..	3 0 2
250,000	100	,,	4½	Melbourne } 4½ p. c. Deb.	104—106	..	4 4 11	902,300	Stk.	June 14	7½	South-wark and Vauxhall } Ord. . . . 7½ p. c. max. . 5 p. c. Pref. 4 p. c. A Deb.	203—208	..	3 12 1
541,920	20	May 31	8½	Monte Video, Ltd. . .	10¾—11½	..	6 1 8	126,500	100	,,	7½		188—193	..	3 17 9
667,946	Stk.	Aug. 30	9½	Newc'tle & Gateshd Con.	210—215	..	4 6 1	489,200	Stk.	,,	5		155—160	..	3 2 6
299,855	Stk.	June 28	8½	Do. 8½ p. c. Deb. .	104—107	..	3 5 5	1,019,585	,,	Oct. 12	4		128—133	..	3 0 2
150,000	5	May 16	8	Oriental, Ltd. . . .	7—7⅞	..	5 6 8	1,155,066	Stk.	June 14	10	West Middlesex . . .	278—283	..	3 10 8
135,000	5	,,	8	Do. New, £4 10s. pd.	5⅞—6⅛	..	5 15 3	200,000	,,	,,	4½	Do. 4½ p. c. Deb. .	140—145	..	3 2 1
15,000	5	,,	8	Do. do. 1879, £1 pd.	1⅜—1⅝	..	4 11 6	200,000	,,	Sept. 14	3	Do. 3 p. c. Deb. .	97—99	..	3 0 7
					*Ex. div.								*Ex div.		

† Next dividend will be at this rate.

ELECTRIC LIGHTING NOTES.

The Mayor of Keighley laid the foundation-stone of the electricity works for the borough last Friday. For the works the Corporation have obtained sanction to borrow £34,600. It is expected that a supply of electricity will be available by next Easter.

At Bury St. Edmunds, last Tuesday, the electric lighting scheme for the town was advanced another stage by the completion of the battery; and the current was switched on by the Mayoress (Mrs. T. Shillitoe). The whole of the work, from the buildings to the mains, has been carried out by Mr. F. Hastings Medhurst; and the total capital expenditure has been £15,000. The lights connected are equivalent to 1950 8-candle power lamps; and others, to the extent of 1000, are to be added. About 5000 yards of cables have been laid for the supply of private consumers; none of the streets being lighted by electricity.

According to the latest Consular report, the progress of electric lighting, and other applications of electricity, still continues its onward course in Wurtemberg. The Stuttgart works, driven by steam, produce 1500 kilowatts, including reserve power; the normal capacity of the accumulators, including reserve, being 695 kilowatts. No fewer than 36,703 incandescent lights and 560 arc lights were installed up to the beginning of the present year. The total horse power amounts to 1340. It is proposed to increase this by 400 kilowatts by the utilization of the water power at Marbach. The Stuttgart street trams are also driven by these works; the overhead system being the one in use.

Paignton is to enjoy the benefit of electric lighting on unusually advantageous terms. The District Council have obtained a Provisional Order, but have taken no steps to carry it into effect. Mr. Paris Singer, a wealthy local resident, of scientific tastes, has now come forward with an offer to relieve the Council of the risk and cost of providing electric lighting for the centre of the town, and to give the District Council the option of purchasing the undertaking within any reasonable time for the amount of his outlay. As this virtually means that Mr. Singer takes all the risk and the town has the option of reaping the profit, if any should result, the Council are naturally disposed to close with the offer.

The people of Dudley have great hopes of their electricity undertaking, for which £33,000 has been borrowed, and an additional £10,000 has been asked for free wiring purposes. The main thoroughfares were illuminated for the first time on Monday last week; the current being "switched on" by Mrs. Dunn, the wife of the Chairman of the Corporation Tramways and Electricity Committee. The tramways have been supplied with current for two or three weeks; and the consumption for this purpose, Alderman Dunn smilingly states, has far exceeded expectation. Perhaps he will not smile when the working statement of the tramways is presented to him. Anyway he believes the time is not far distant when the generating station will have to be enlarged.

On Monday night last week the principal main thoroughfares of Dudley were illuminated by the electric light. The sum of £33,000 has been borrowed to carry out the scheme, and an additional £10,000 is to be obtained for the free wiring of houses and business premises for electric light purposes. For private consumption, the cost will be 6d. per unit, for two hours per day, and 1½d. per unit for the remaining 22 hours. It is estimated that electric lighting in Dudley will require 270,000 units a year. The inauguration of the lighting was celebrated at a gathering of the members of the Town Council and their friends at the newly-erected power station at Springsmire. After some appropriate remarks by the Mayor (Mr. Edward Grainger), Alderman G. H. Dunn (the Chairman of the Tramways and Electric Lighting Committee) remarked that the generating station was not completed, but so far the work of installation had been very satisfactory to all concerned. He believed that the time was not far distant when they would have to enlarge the power station. Subsequently Mrs. Dunn switched on the current, and the main thoroughfare was illuminated.

The Electric Lighting Committee of the Ryde Corporation presented a report at the meeting last Friday, in which they recommended that they should be empowered to instruct Messrs. Kincaid, Waller, and Manville to obtain tenders for carrying out the electrical works according to the plans already received from them, and approved by the Local Government Board; and further that, on receipt of the tenders, they should be authorized to instruct the Finance Committee to make arrangements for obtaining a loan for carrying out the works. Mr. Barton, in moving the adoption of the report, explained the course the Committee had taken, and claimed that they had acted in good faith in opposing the Company, believing that the Council were behind them. Whether he stood alone or not, he distinctly believed that the town had made as great a mistake now as when they refused to purchase the gas-works. But, as the thing was dead, he was not going to oppose the Company for the sake of doing so, but would now help to make the electric light a success. Alderman Marvin seconded the recommendation. Alderman James moved, as an amendment, that the matter be referred back to the Committee. Mr. Thirkell seconded the amendment. Alderman Groves said he had refrained all through from voting on this matter. It had been insinuated that he held different views now from what he did once. He acknowledged that he had. He still believed that a town should carry out its own lighting and watering; but the startling figures of £30,000 to £35,000 decided him not to support the proposal that Ryde should enter on such a speculation. The amendment was carried with two dissentients.

Leeds and Harrogate Water Schemes.—News comes to hand that the Harrogate and Leeds Corporations will not encounter each other before Parliament over their new water schemes; friendly conferences having led to an agreement to join hands in the exploitation of the watershed upon which both municipalities have had their eyes. But the terms of the arrangement have not yet been disclosed. The watershed in question has an extent of 26,000 acres—the valley of the Burn having 17,500 acres, the Laver 7000 acres, and the Skell 1700 acres. Of this, Harrogate sought to take 3000 acres; but to this Leeds demurred—the Corporation having been keeping records of the rainfall on the watershed for some years past. Both Corporations will proceed with their Bills in the ensuing session of Parliament.

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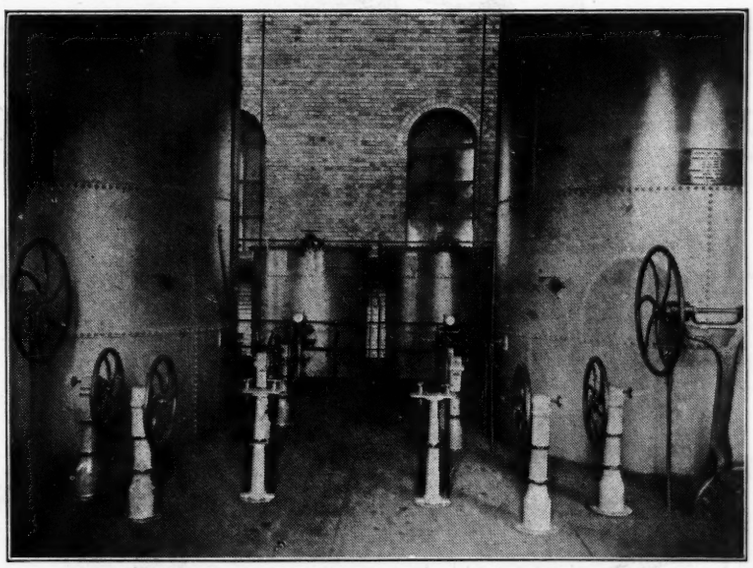

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LONDON COUNTY COUNCIL AND THE WATER COMPANIES.

The Finance Committee of the London County Council have prepared the following special report on the Water Committee's purchase proposal (see *ante*, p. 1160), to come before the Council to-day:—

It devolves upon us to report upon the financial bearings of the Water Committee's proposal for the purchase by the Council of the undertakings of the eight Metropolitan Water Companies. The Water Committee are not at present submitting a detailed scheme of purchase, but are merely asking the Council to "decide the broad question of maintaining the policy of purchase." We have in former years reported to the Council generally upon the financial conditions involved in the proposal to purchase these undertakings, so far as it appeared possible to us to consider them. Since our last report, however, the Royal Commission on the London Water Supply has issued its report, which specially deals with the question of purchase in its financial aspects; and this report has already been considered by the Council. We cannot do better than remind the Council of the main conclusions at which the Commissioners arrived on this matter.

If purchase of the Water Companies takes places under the usual arbitration terms, and with the usual requirement of a sinking fund when a public authority is the purchaser, the result of a just and fair arbitration will be that the water charges must be raised for the period during which the proceeds of the Chamberlain's fund fails to cover the sinking fund required from the purchaser, or that rates-in-aid must be levied to make up the deficiency of the existing water charges. Having regard to the prospective requirements of supply in Water London, we are of opinion that it is desirable that the undertakings of the Water Companies should be acquired and managed by a public authority. But we must add that, if the purchasing authority is required to provide a sinking fund to redeem in 60, or even in 80, years the money borrowed to furnish the purchase-money and to increase the water supplies, then the administrative advantages we have enumerated will be accompanied by a deficit in the income, which can only be met by increasing the water charges or coming upon the ratepayers. If Parliament thought fit to dispense with a sinking fund, we think that a purchaser would be able, by maintaining the present water charges, to pay his way, and that the growth of the water revenue would render it possible to reduce the charges for water sooner than such reduction could take place under the management of the Companies through the attainment of their maximum dividend and the payment in full of their back dividends. Further, that reduction would extend to the New River district, in which no reduction is obligatory so long as the Company subsist with their present rights.

The Council will observe that the Commissioners, after careful consideration of the financial question, recommend purchase, and record their opinion that, apart from the question of a sinking fund, there might not only be no charge on the rates, but that the water consumers might obtain a reduction of the charges for water sooner than under the present system. We note that the proposed instruction to the Parliamentary Committee includes the preparation of "the necessary Water (Finance) Bill," which we presume will be upon the lines of the Bill approved by the Council in 1898.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The last meeting of the Dumfries Gas Commission was not of an edifying nature. The investigations into the affairs of the late Treasurer (Mr. Herries) is being conducted by Mr. M'Lintock, C.A., of Glasgow; and one of the members, who had been primed with information received outside, insisted that a minute of the Committee meeting should be read. When the minute was read, it was found to contain nothing except a statement that the new Treasurer had been examined by the Committee; and that the Committee had given instructions as to the conduct of the inquiry by Mr. M'Lintock. The new Treasurer, it transpired, was exonerated by the Committee from any blame in the affair. This was almost a matter of course; for he could not be held responsible for the method of book-keeping in use when he was appointed. He is doing his best to get it altered. But the situation was this—that members of the Commission were getting information from the man in the street as to what the Committee were doing, but could learn nothing from the Committee themselves. It is, no doubt, a little annoying to a town councillor to find that outsiders have more information than he has; but he ought to remember that the outsider has no responsibility, whereas he has, and that in such a delicate matter as the formulating of a claim upon the estate of a deceased official to make up for a delinquency, it is better to proceed cautiously. It would have been a more correct attitude for this gentleman to have preferred to know nothing until the Committee were prepared to report, rather than to discuss with anyone information which might turn out to be altogether erroneous. There was another incident at the meeting which does not fill the reader with respect for the business capabilities of at least one member of the Commission. According to the narrative which was given in the presence of the gentleman, and not contradicted, he owns a house in English Street, the tenant of which complained that the gas supply was bad; that the proprietor would do nothing; that the tenant ordered a new service pipe to be laid, at her own cost (about £2), which was done; and that the Commissioner then averred that his old service-pipe had been stolen. He was assured that the old service-pipe was not interfered with, which statement he disputed; and he also complained that his property had been entered upon and torn up without notice to him. The same gentleman had a further complaint, to the effect that another house of his had been entered without his permission, and a gas-meter fixed up in it, from which there was now an escape of gas so bad that he would require to call in the sanitary inspector. It was explained to him that gas meters were put in at the request of tenants, the consent of landlords not being required; and that in this instance it was the fittings in the house, and not the meter, which were leaking. It is really matter of wonder that such a man as this should receive the suffrages of his fellow citizens; for it cannot be said that, in either of the matters referred to, he was acting in the public interest.

The municipal elections are over, and town councils are settling down to their work for the year. I scarcely think that there will be any effect

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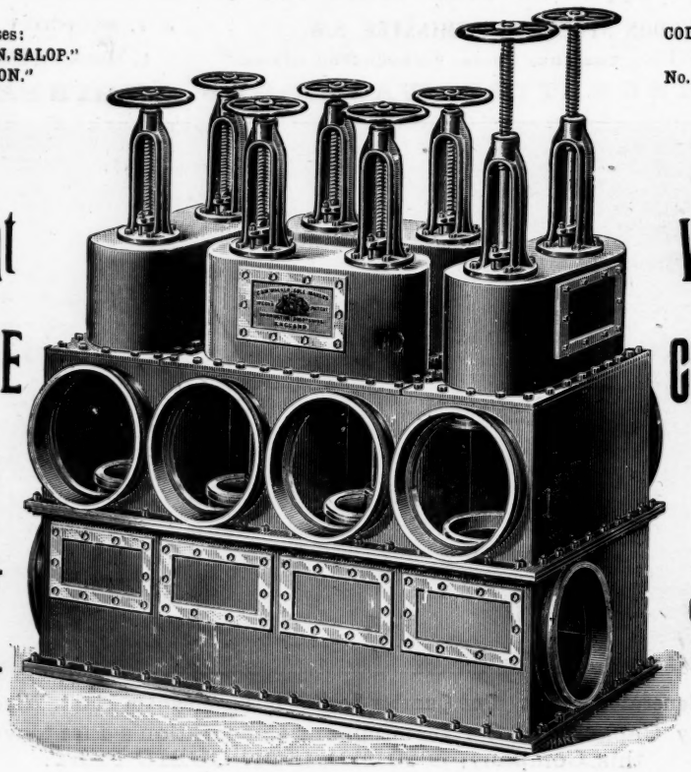

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upon gas supply following the election, except in Dundee, where, I observe, the "Dundee Courier" claims that an inquiry into the gas supply must now be held. There have also, since the election day (Tuesday), been letters in the newspapers, by leading members of the Corporation, making and contradicting statements which are of little concern to anyone but themselves. The best inquiry would be for the members to read up the minutes and study them; and they would find how they or their predecessors dealt with questions relating to the gas supply. They would there learn something not to the credit of the public men of the town. I do not know that any further inquiry is necessary, or would be profitable. If there were any charges of malversation, it would be different; but unless there be some covert meaning in what has been said, we are happily spared that degradation. The only approach to a charge involving reputation which I have seen, was a remark that the coal contracts were nearly all placed with Dundee coal merchants; the insinuation being that coal would be obtained cheaper if outside competition had been allowed. I would not be surprised if it were true that Dundee coal merchants have been preferred to others; for Dundee is a very parochial place. But even so, there could not be much difference between Dundee merchants' prices and the prices sent in by outside offerers. All this will, or should be, found in the minutes. It is high time that this Dundee scare were at an end. It appeals to me as little more than a newspaper flare-up; and it has possibly, if that surmise be correct, served its purpose. If the intention be to alter the policy of the Gas Commission, the agitation will go on. In this case, there will be further damage to public reputations, of which there has already been more than is desirable; and my task of writing upon an unpleasant subject will not have ceased, as I would fain hope it has.

At a meeting of the Cupar District Committee of the Fife County Council, on Tuesday, there was under consideration a claim by the Kettle Gas Company for compensation in respect of damage to gas-pipes by a road-roller. The Committee resolved to offer the Company £5 in full discharge of their claim. In a similar claim by the Auchtermuchty Gas and Water Company it was resolved to deny liability, on the ground that the Company have no right to lay their pipes where they are, whatever that may mean.

The "Dalkeith Advertiser" this week contains the following: "In connection with the statement made by Bailie Chisholm at the ratepayers' meeting on Thursday last, and with the certificate of Mr. John Hunter, County Analyst, to the effect that the illuminating power of the gas was equal to 15·9-candle power, the Dalkeith Gas Company on Monday issued a statement, signed and declared by Mr. A. Bell, the Manager, before a Justice of the Peace, that the power of the gas regularly supplied in the town was from 24 to 25 candle power. The Gas Company further declare that Mr. Hunter had refused to say anything of the place and conditions under which his analysis was made. In reply to this, a statement signed by Mr. Hunter was distributed in the town stating he had told Mr. Bell that if he was going to question his results he would be prepared to defend himself, and to absolutely defend any report he had given upon gas or anything else." Now, Bailie Chisholm's remarks at the meeting of ratepayers consisted of a long denunciation of the Dalkeith Gas Company. In 1893, he said, he collected statistics upon the subject of public lighting; and he then found that Dalkeith was one of the most expensively lit towns in Scotland. At that time he proposed that they should acquire the gas undertaking, under the Burghs Gas Supply Act; but his suggestion was lost by one vote—on the motion of Dr. Lucas, who was a Director of the Gas Company. If, he said, they had adopted the Gas Act then, consumers would now be paying about half what they are; and by this time they would have had a good part of the purchase-price paid off. Dr. Lucas's argument in 1893 was that the Gas Company were about to introduce the oil process, and to manufacture gas of 30-candle power for 1s. 4½d. per 1000 cubic feet. The price of 16-candle power gas at present was 4s. 5d. per 1000 feet. The cost of coal had absolutely nothing to do with the raising of the price of gas by 5d.; it was raised in order that the Company's usual dividend of 15 per cent. might be kept up. The customary dividend was 15 per cent.; but in 1889 the Company paid 30 per cent. Well, these statements had their effect; and Bailie Chisholm was returned by a larger vote than any of the other municipal candidates. The report of Mr. Hunter is a serious matter. The Company should not lie still under it, but should compel a full disclosure of the circumstances of the analysis. We have seen, before now, how surreptitious tests of gas have broken down; and I expect that, if the circumstances were known, Mr. Hunter's would share the same fate.

A proposal is being considered for the lighting of Clachnaharry, a suburb of Inverness. There is a difficulty in the matter, in respect that the Caledonian Canal comes in between the two places, and the gas supply does not, as yet, extend to the west side of the canal. In a report on the subject to the Town Council, the Gas Manager (Mr. J. Thomson) says that a jointed pipe might be laid along the bridge; but in this case the gas supply would be interrupted when the bridge was opened to allow ships to pass. Another method considered was the tunnelling of the canal; but this operation might interfere with the stability of the canal works. The suggestion Mr. Thomson made was that when the canal is emptied for repairs, a 3-inch gas-pipe should be sunk into the masonry of the bridge on both sides, and should cross the bed of the canal. By being sunk in the masonry, the pipe would not be liable to be damaged by passing vessels. The cost of the whole scheme would be £470; and there would be an annual revenue from public lighting alone of £28. When the subject came before the Town Council this week, someone suggested that they should supply the place with acetylene gas; and it was resolved to ask Mr. Thomson to report upon other methods of lighting than by coal gas.

It is announced that the Directors of the Cairntable Gas Coal Company, Limited, have had before them the accounts of the Company for the year ending Sept. 30, which showed a credit at the balance of profit and loss account of £12,396; and that the Directors have resolved to pay a dividend at the rate of 22½ per cent., to write off £500 for depreciation of plant, to place £500 to reserve fund, to award the Directors a bonus of £241, and to carry forward £296.

So far as any question of note affected the municipal elections in Arbroath, it was that of the water supply. The enlargement of the wells is completed; and it is known that the supply which can be obtained

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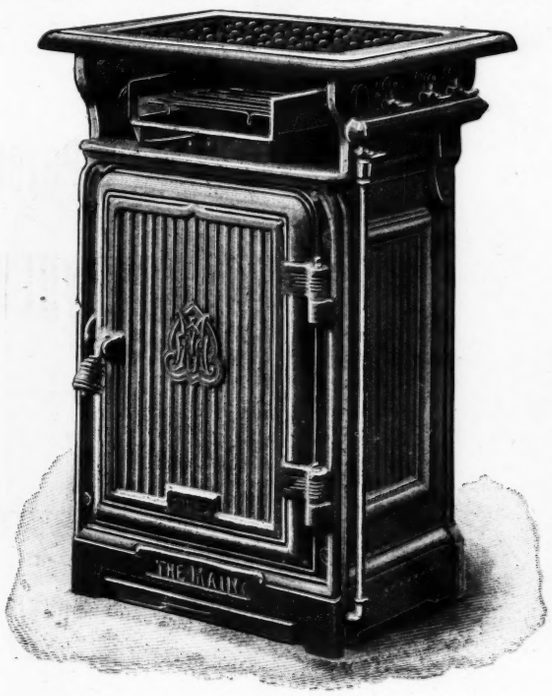

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from them is not more than 12 gallons per head per day. But the full significance of this fact was not pressed upon the attention of the electorate, who are still largely in ignorance of the alarming state of the water supply of the town. It will dawn upon them some day that they have been throwing away money—some £8000 or £10,000—in searching underground for water, when there was abundance to be had in the rising grounds in the neighbourhood. Meantime, the elections have gone against the advocates of a gravitation scheme.

Last night Mr. Robert Wilson, the Treasurer of the Water Department of the Glasgow Corporation, delivered a lecture upon "The Glasgow Water-Works," under the auspices of the District Council of the National Registration of Plumbers. Mr. Wilson gave the following items of information: The aqueduct which conveys the water is 12 feet by 9 feet. The new track is 23½ miles long, of which 22¼ miles are completed. The whole is expected to be finished next summer. The present delivery of water is 51 million gallons per day. When the new aqueduct is completed, it will be possible to carry 110 million gallons per day. The cost of tunnelling through rock is from £27,000 to £30,000 per mile. The new reservoir was estimated to cost £130,000; but on account of difficulties encountered in the formation of the embankment—it being necessary, in some places, to go so far down as 200 feet—the actual cost was £316,000. The area supplied is 11 miles by 15 miles, and contains a population of 1,032,000. Last year the revenue was £212,000, of which £65,000 was derived from rates on houses, £125,000 from manufacturers, and £19,000 was the public water-rate. The capital expenditure had been £3,840,000. Of this sum, £1,014,000 had been repaid; the rate of repayment being £60,000 a year. The entire capital should be repaid by 1950. In 1862, the water-rate was 1s. 4d. per pound; it is now 5d. Then the manufacturers were charged 1s. per 1000 gallons; the price is now 3½d.

It was stated at a meeting of the Edinburgh and District Water Trust this week that six out of the ten years allowed for the completion of the Taller augmentation works have now elapsed; that the progress has been exceedingly slow; and that the works cannot be finished by 1905, the time fixed by Act of Parliament. It was resolved to apply to Parliament for a Provisional Order, extending the time for the completion of the works by five years, and giving the Trustees additional borrowing powers to the extent of £200,000. The borrowing powers at present amount to £1,150,000.

The Bondholders' Committee of the Pernambuco Water Company, appointed on the 29th of August, 1892, are prepared to pay the holders of certificates issued by the Committee in exchange for bonds the sum of £2, less income tax, in respect of such certificates. The payment is in full discharge of the coupon due July 1, 1899, in conformity with the agreement entered into with the Company on Nov. 23, 1898. Messrs. Knowles and Foster are prepared to pay the holders of the "A," "B," and "C" certificates 2 per cent. on the face value of such certificates, less income-tax. This payment is to be in full discharge of interest due July 1, 1899, in conformity with the above-named agreement between the Committee of Bondholders and the Company.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Nov.* 10.

Sulphate of Ammonia.—Until near the end of the week, the market remained in a weak condition; but at the close it had recovered—the quotations being £10 11s. 3d. to £10 12s. 6d. per ton f.o.b. Hull and Leith, and £10 15s. to £10 16s. 3d. per ton f.o.b. Liverpool. Considerable sales were made by makers at £10 10s. and £10 11s. 3d. per ton f.o.b. Leith; but now there are no sellers at this price. Consumers have not had a large share in the buying; the bulk of it having been done, it is understood, for "covering" November sales. In the forward position, too, more interest has arisen; but the firm attitude of makers still hinders business. London, Beckton terms, is still quoted £11 5s. per ton over spring months; and the same price is asked, ordinary terms, f.o.b. other ports, though speculative sales have been made abroad at substantially below the equivalent of £11 5s. per ton.

Nitrate of Soda is firm in all positions; and spot quotations remain at 8s. 4½d. to 8s. 6d. per cwt. according to quality.

LONDON, *Nov.* 10.

Tar Products.—There is a brisk demand for benzol, unexpected increasing quantities being used for gas enrichment; and, large as it is in this country, it is much greater in Germany and in France. It is stated by the Directors that the whole of the benzol produced at the Paris Gas-Works is being used in this way. The demand for naphthalene is good; and the several new applications of this article are likely to put it on to a higher platform of value for some time to come. Carbolic is said to be weak. But there is a good demand; and there are buyers at the lower quotations. Creosote continues plentiful, pitch is moderately firm, anthracene weak, and creosote and heavy oils are still quoted at unprofitable figures.

Business during the week has been marked at: Tar, 15s. to 21s. Pitch, east coast, 34s. 6d.; west coast, 31s. 6d. Benzol, 90's, 10½d. to 1s. 0½d.; 50's, 1s. 1½d. Toluol, 1s. 3d. Solvent naphtha, 1s. 2d. Crude naphtha, 5d. Heavy naphtha, 1s. Creosote, 2d. Heavy oils, 2⅝d. Carbolic acid, 60's, 2s. 6d. Naphthalene, 85s.; salts, 65s. Anthracene, nominal, "A," 3¾d.; "B," 2¼d.

Sulphate of Ammonia is only in moderate odour. There are, however, one or two urgent buyers, which looks as if foreign business is in a restricted channel. The value may be taken at about £10 10s. per ton, less 3½ per cent.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The outlook in the coal trade of this district continues to indicate the probability of weakening prices in the not very distant future; but the only question which is at present at all necessitating serious attention is with regard to the forward contracts for engine fuel. For some time past there has been keen competition

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here with slack coming in from other districts—Yorkshire more particularly; and several meetings of the Lancashire Coal Sales Association have been held to consider the position. There are one or two very important renewal contracts for large quantities of slack to be settled very shortly; and an effort is being made to decide upon some basis for tendering. A few contracts have already been settled at 1s. to 1s. 6d. per ton under current rates, on the basis of about 9s. at the pit, for the better qualities of slack. What will be done with regard to the more important contracts to be settled very shortly, has not yet been decided; but a basis of something like 2s. 6d. per ton over the prices taken last year is under consideration. The current list basis for the better qualities of Lancashire slack remains at 10s. to 10s. 6d.; but inferior sorts are to be bought at under this figure, and slack from other districts also continues to compete at below local quotations. The better qualities of round coal are still moving off fairly well, with no very appreciable accumulation of stock. Common round coals are being disposed of without much difficulty for inland and shipment, although there is a lessening pressure of requirements. At the pit, the better qualities of house coal remain at about 16s. 6d. to 17s. 6d. per ton, seconds 15s. to 15s. 6d., common 14s. to 14s. 6d., steam and forge coal 12s. 6d. to 13s., while 16s. to 16s. 6d. are about the average quoted prices for good steam coal, delivered at the Mersey ports. Merchants, however, report they are able to place orders at as low as 15s. 3d. to 15s. 6d. The makers of the better qualities of foundry cokes are still holding firmly to their recent quotations; and at a meeting recently held, the decision was come to that no necessity had so far arisen for any reduction in prices—the average basis being 28s. to 30s. at the ovens. The lower qualities, for furnace purposes, however, are not in so strong a position, owing to the slackening off in the iron trade; and it is reported that many coke-ovens are being put out, as relatively better prices can be realized on the slack. Ordinary furnace cokes are now quoted at from 15s. to 15s. 6d. per ton upwards at the ovens.

Northern Coal Trade.—The coal trade is rather more active in this district; and there is a very full export for this season of the year. The tendency of prices is still on the whole towards ease, but not so markedly as it was a week or so ago. Best Northumbrian steam coals are quiet and plentiful at from 16s. 9d. to 17s. per ton f.o.b.; second-class steams being 16s. to 16s. 3d., and steam smalls from 8s. 9d. to 9s. There is now a much fuller delivery of gas coals; and the demand is very near its highest point. The price quoted varies from 16s. 3d. to 17s. per ton f.o.b. for best Durham gas coals; but comparatively little is being sold, as the amount of coal left free is limited. In the coke trade, there has been some reduction of the production, and thus the fall in the price has been checked. Best Durham coke for export is quoted from 24s. to 27s. per ton f.o.b. Blast-furnace coke is about 23s. per ton at the Teesside furnaces. Gas coke is still quoted at 24s. to 25s. per ton f.o.b.

Scotch Coal Trade.—The view of the coalmasters upon the fall in prices came out last week, and was to the effect that buyers were holding up orders for the purpose of allowing stocks to accumulate, and so lead to lower prices; but it was expected that, when those held-up orders came in, prices would again harden. The general view is that orders are being held up, not temporarily, but until prices come down. Every possible shift to do without coal is being made; and if the miners continue working, stocks are certain to accumulate. During the week prices have gone down still further. The quotations are: Main 13s. 6d. to 13s. 9d. per ton f.o.b. Glasgow, ell 14s. 6d. to 15s. 6d., and splint 15s. 9d. to 16s. The shipments for the week amounted to 226,344 tons—an increase of 20,236 tons upon the previous week, and of 63,239 tons upon the corresponding week of last year. For the year to date, the total shipments have been 9,427,930 tons—an increase of 2,100,883 tons upon the same period of last year.

The Norwich Corporation and the Water-Works.—At a recent meeting of the Norwich Town Council, the Law Committee presented a report on the subject of their proceedings in connection with the suggested acquisition of the undertaking of the Norwich Water Company by the Corporation. They recorded that, in reply to a communication sent to the Secretary of the Company, they were informed that the Directors were unable to enter into negotiations for the sale of their property. As this closed the door to friendly interviews, the question arose as to the advisability of the Corporation promoting a Purchase Bill. The Committee considered this, and advised that nothing should be done in the matter next session. Mr. L. J. Tillett moved a resolution to this effect. Mr. Searles proposed, as an amendment, that a deputation from the Council should interview the Directors of the Company, with the object of seeing whether anything could be done to open negotiations. On being put, however, only the mover and seconder voted for it, and the Committee's report was then adopted.

The Gas-Meter at the Rotherhithe Baths.—At the final meeting of the Rotherhithe Vestry, held last Wednesday, the Baths and Washhouses Committee submitted a report in reference to the gas-meter at the baths, which, it was stated, had for eighteen years registered only one tenth of the quantity of gas consumed, owing to the dial indications being at fault (see *ante*, p. 797). The Committee stated that some years ago they expressed surprise at the small bills, and had the meter tested; but it was certified to be quite correct. No further notice was taken of the matter until the South Metropolitan Gas Company sent in a bill for £2947 for the arrears, and asked for a cheque, but offered to take the amount in instalments. The Committee, on the order of the Vestry, consulted Mr. Macmorran, Q.C., as to their liability in the matter, and they received from him the opinion that the Vestry could not require the Overseers to levy a poor-rate to meet the claim. Such a rate would be retrospective, and therefore liable to be quashed if any ratepayers appealed against it. He therefore could not advise the Vestry to pay the claim, except in obedience to a *mandamus* or order of a competent Court. The views of the Local Government Board might be obtained as to raising a loan to meet the claim; but he doubted if such sanction would be given. As the result of this opinion, the Committee recommended that the Clerk be instructed to inform the Company that the Vestry had no power to levy a retrospective rate to meet the claim, and that, therefore, they could not admit any liability in the matter. The recommendation was unanimously adopted.

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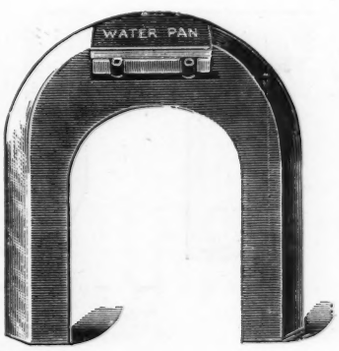

See Feature No. 4.

Gas Workers' Wages in Lincoln.—At the meeting of the Lincoln City Council last Tuesday, the Gas Committee reported that they had raised the wages of their workmen, and that in future ordinary stokers would be paid 5s. 3d., and leading stokers 5s. 4d. a shift, and that the purifiers' wages would be 21s. per week.

Oriental Gas Company, Limited.—At the meeting of this Company to-morrow, the Directors will report that during the year ending the 30th of June last the business made satisfactory progress. The revenue from the sale of gas was larger than that for 1898-9; and the profits arising from the disposal of the residual products also exhibited a proportionate increase. The balance of the profit and loss account (after payment of the interim dividend of 3½ per cent. and income-tax in June last, and after appropriation to the reserve fund) is £15,859, out of which the Directors will recommend the payment of a dividend of 4½ per cent., free of income-tax; making a total dividend of 8 per cent. for the year, and leaving a balance of £2359 to be carried forward.

Incandescent Gas v. Electric Lighting at Guildford.—At a recent meeting of the Guildford Town Council, the Lighting Committee reported that they had made an inspection of the various streets where improved lighting was reported to be necessary; and extra incandescent gas-lamps were ordered. They did not consider the experimental lamp fixed by the Electric Supply Company in North Street to be satisfactory; and therefore they recommended the Council not to proceed further in that direction. In the course of the remarks made upon the report, incandescent electric lighting was regarded as not being well suited for the public streets, while satisfaction was expressed with the incandescent gas-lamps all over the town. On the same occasion, a proposal to light the town clock by electricity, at an estimated annual charge of £30, exclusive of the cost of the installation, was, on the recommendation of the General Purposes Committee, abandoned, on the ground that the cost would be greater than was commensurate with the benefit to be derived.

Gas Poisoning in Belfast.—Last Tuesday morning, a serious case of gas poisoning was discovered in a spirit-grocery establishment in Belfast. The premises were rather late in being opened, and the neighbours, suspecting that something was wrong, endeavoured to effect an entrance. In doing so, by means of a window, they perceived a strong smell of gas, which escaped as soon as there was sufficient ventilation. Two men were found lying in bed unconscious. In another apartment a woman was found in a like condition. Medical assistance was promptly summoned, and, under careful treatment, the woman recovered, as well as one of the men. The other had to be removed to the Belfast Royal Hospital. It appears that the gas had escaped by being only partially turned off in the bedroom occupied by the men. The last reports in regard to the man in the hospital were that he was progressing satisfactorily. Another case occurred on Wednesday, when Sarah Pennington, a young woman in service at Osborne Park, was found lying in an unconscious condition in her bed, having been overcome by an escape of gas. She was removed to the hospital, where everything was done to restore her. She remained, however, in a critical state all day; but the opinion of the medical staff was that she would recover.

New Water-Works for Tenby.—The Tenby Town Council agreed to instruct Mr. James Mansergh to prepare plans, specifications, and estimates for filter-beds, and to ask the Local Government Board's permission to borrow £3000 to cover the cost.

The Yulcan Incandescent Light Syndicate, Limited, has been registered with a capital of £10,000, in £1 shares, to manufacture and deal in incandescent light mantles, burners, glassware, lamps, and accessories, &c. The offices of the Company are in Manchester.

The Gainsborough Gas Purchase Loan.—At the meeting of the Gainsborough Urban District Council on Monday last week, the Gas Committee requested permission to increase the gas purchase loan from £85,500 to £86,761, and recommended that the offer of the bankers to lend the additional sum of £1269 at 4½ per cent. be accepted. Mr. Cooper explained that the extra money was the result of costs sprung upon the Committee since the first loan was requested. The permission was granted.

Public Lighting by the Incandescent Gas System in Mid-Cheshire.—A parish meeting of the inhabitants of Winnington, near Northwich, was held last Tuesday for the purpose of considering the advisability of adopting the Lighting and Watching Act. In the main streets of the township, Messrs. Brunner, Mond, and Co. have for many years maintained 45 lamps free of cost. Estimates were submitted for lighting the remainder of the district with 28 Welsbach incandescent lamps by the Northwich Gas Company. Messrs. Brunner, Mond, and Co. also undertook to have Welsbach burners placed in all their lamps at their own cost, to hand them over to the Parish Council, and to supply the gas for £45 a year. The total estimated cost of lighting the district is £222 10s. 6d. per annum. The Act was adopted, and it was decided to levy a rate of 2½d. in the pound, which will realize £217 16s. 8d.

New Water Supply for Shadwell (Yorks.).—About two years ago, the need for a new water supply for the township of Shadwell, near Leeds, forced itself upon the inhabitants; and a contest began as to whether it should come from Wetherby or from Leeds. The Wetherby District Council, some of whose members are shareholders in the Wetherby Water Company, in the first instance claimed in Parliament the right to supply water to Shadwell as a portion of their territorial area. Pressure was brought to bear on the Leeds Corporation by residents to include the township in the Leeds area of supply; but the application of Wetherby was successful, notwithstanding influential opposition by Leeds. The District Council next applied for an Act to enable them to supply the water by a series of wells. This was opposed by the Corporation, on the ground that the wells were within the radius of their Eccup reservoir. Subsequently, the contending parties came to terms, under which Shadwell was allowed to have Leeds water. This was turned on on Saturday, the 3rd inst., in the presence of a numerous company, by Mr. J. W. Bannister, Chairman of the Shadwell Parish Council. Mr. J. M. Sagar-Musgrave worked hard in the interests of his fellow residents in Shadwell to secure the improved supply; and to him and to Alderman Cooke, Chairman of the Water Committee of the Leeds Corporation, is largely due the credit for a very satisfactory solution of a vexed question.

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The Chairman of the Bradford Corporation Gas Committee a Little Exercised.—In the speech of the Mayor (Mr. W. C. Lupton) at the annual meeting of the Bradford City Council last Friday, there appeared a statement which, in the mass of other subjects dealt with, almost escaped notice; but it is too good to miss being recorded in these columns. The Mayor said the Parliamentary Bill of the past year was undoubtedly the heaviest one that had been promoted by Bradford. The undertaking of the North Bierley Gas Company had been acquired. Whether the price given was satisfactory or not to the city he was not prepared to say; but he believed Alderman Aykroyd, the Chairman of the Gas Committee, was a little exercised in his mind about it, and inclined to think that—for the present, at any rate—the Corporation should be very careful in any further projects for purchasing any other of the large gas undertakings in the locality.

The Scarcity of Coal in Russia.—A report from our Commercial Agent at St. Petersburg on the present scarcity of coal in Russia is published in the "Board of Trade Journal." It appears that the demand for coal and fuel of all kinds is still increasing daily in Russia; and as prices are rising accordingly, the authorities have further enlarged the measures designed to develop the home supply. The period during which the railways are authorized to import coal free of duty has been extended to July next; and there is every probability of further indefinite extensions, for the increase of the Russian mines does not keep pace with the growing requirements. The production during the first six months of the present year shows no improvement. The estimate for the current year is over 10¾ million tons from the Donetz basin, a little over 4 millions from Poland, and over ¾ million from other places; giving a total of about 15½ million tons, which, it is calculated, will be less than the quantity required for consumption by upwards of 1½ million tons. The owners of the collieries in the Donetz basin reported lately to the Minister of Agriculture that they proposed increasing their yield to nearly 13 million tons next year, and in 1904 to over 16 millions. But it is believed in the meantime the demand will augment by 50 per cent., and that in 1905 it will be over 24 million tons; so that "the present crisis is no crisis at all, if the word is used in its ordinary sense, as implying but a temporary duration of an abnormal state of affairs." Moreover, the native supply of coal has to overcome the obstacle of the defective transport, which has hitherto proved quite insufficient to cope with the demands of distribution. The iron industry suffers most heavily from the present scarcity. A new feature in Russia, as elsewhere, is the importation of American coal, of which one cargo has arrived at Kronstadt. Representatives of some of the railways have been sitting at Kharkoff to discuss the use of anthracite and semi-anthracite. The value of peat as a fuel is also being urged. New peat coke-works have recently been opened on the St. Petersburg-Moscow line, where a process, hitherto in use only in Oldenburg, is to be employed in producing coke, tar, aniline dyes, and the like, from peat. The figures show that during the first six months of the present year the total production of coal in Russia was 7,686,848 tons. Of this bulk the Donetz basin yielded 5,338,710 tons; Poland, 1,964,391 tons; the Urals, 203,120 tons; Central Russia, 146,997 tons; and the Caucasus, 33,630 tons.

Slough Gas Company.—The half-yearly general meeting of this Company was held on the 1st inst.—Mr. R. Martin in the chair. The accounts presented showed that the revenue in the six months covered by them was £4123; the expenditure, £3024. The net profit was £1098; and the statutory dividends were declared.

Yeovil Water Supply.—The Yeovil Town Council have spent £12,000 upon a new storage reservoir, but have no water to put into it. Springs which were acquired last year under parliamentary powers, and which it was thought would supply water by gravitation to the reservoir, are now found to be practically on the same level.

Gas Profits and Rates Question in Manchester.—At the meeting of the Manchester City Council last Wednesday, the minutes of the Gas Committee were adopted without discussion. The only items of special interest in connection with the Committee's proceedings related to the acceptance of tenders for four new purifiers which are required at the Bradford Road station, and also for supplementary supplies of coal and cannel. The last item on the *agenda* was the motion by Alderman Gibson to the affect that the present system of subsidizing the rates out of the profits of the gas undertaking is wrong in principle, unjust in practice, inimical to the best interests of the ratepayers, and ought to be abolished. This proposal had, as our readers are aware, figured on the paper at two previous meetings; and on both occasions discussion of the question was adjourned. On Wednesday, Alderman Gibson was for the third time compelled to ask that consideration of the matter should be postponed to a future meeting; the hour being so late that there was not sufficient time to adequately deal with the matter that day. The motion will therefore probably come up for discussion at the December meeting of the Council, when, it is hoped, a definite decision will be arrived at.

Teignmouth District Council and the Gas-Works.—The management of the gas-works continues to be made the subject of bickering among members of the Teignmouth District Council. At a meeting of the Council last Tuesday, Mr. Hutchings pointed out that the income from the undertaking in the September quarter was only £716, or £110 less than in the corresponding quarter of last year, while they had purchased more coal. It seemed to him a very serious state of things, though it possibly arose in part from the use of inferior coal. Mr. Banbury, Chairman of the Gas Committee, said 526,000 cubic feet of gas had apparently been lost somewhere. Possibly mistakes had been made in reading the meters; but the matter would be thoroughly sifted. Mr. Harris considered that much of the failure was due to a lack of proper book-keeping in the office. They could not tell where they were, and no business could succeed that was conducted in that way. Mr. Jarvis contended that Mr. Hutchings was only calling attention to these things because his vessels were no longer used to carry coal for the gas-works. Mr. Hutchings denied this, and said that sufficient justification for his action was to be found in the fact that in less than twelve months 900 tons more of coal had been placed in the gas-works, and yet there was this serious falling-off in the revenue. Mr. Banbury remarked that the Gas Manager had most uphill work, for whatever he did was opposed. The Gas Committee would further consider the matter.

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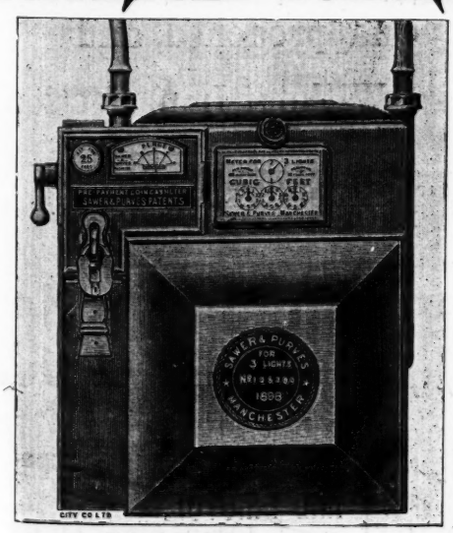
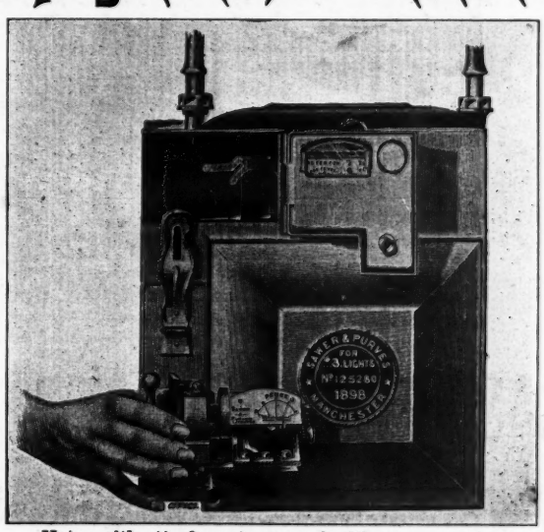


Meter in working position.



Meter with attachment removed without uncoupling.

A Coke-Barge on Fire in the Thames.—Early last Wednesday morning, it was discovered that a fire was raging on the barge *Gamecock*, lying in the Thames off the South Metropolitan Gas Company's wharf at East Greenwich. The barge was laden with coke, which suddenly burst into flames; and the firemen found it necessary to order the river float to get to work on the burning mass. The fire was not extinguished until the barge and its contents were greatly damaged.

Mishap to a Tynemouth Reservoir.—An unfortunate mishap has occurred to one of the first works of the Tynemouth Corporation as the water authority of the borough. Since the Font supply was decided upon, preparations have been made to bring the water to the town; and a reservoir has been constructed at Moorhouses, about a mile north of Preston Colliery. Unfortunately, the discovery has been made that there are workings underneath the reservoir, which is well advanced; and a pit shaft has been exposed.

Darlington Objects to Water Gas.—At a meeting of ratepayers hurriedly called for last Thursday to oppose the introduction of water gas into the borough, the following resolution was unanimously passed: "This meeting of ratepayers, being of opinion that the introduction of water gas for lighting purposes will be dangerous to life and detrimental to health, ask the Town Council not to confirm the resolution to erect water-gas plant; but, if anything is positively needed to meet the growing wants of the town, they urge the addition of a gasholder."

The Buckley District Council and the Gas-Works.—At the monthly meeting of the above-named Council last Wednesday, the principal business was to deal with a recommendation of the Lighting Committee: "That this Council purchase the gas undertaking from the Buckley Gas Company, Limited, at the price of £4250, subject to property, works, and siding being freehold, and to the confirmation of the Local Government Board." In deference to the views of one or two members who thought there was no reason to complete the negotiations so quickly, it was suggested that a special meeting be held a week hence to hear the views of Mr. T. Newbigging on the matter. This was agreed to, and it was also decided that a further meeting should be held on the 21st inst., to come to a final decision on the matter.

The Price of Gas for Motive Power at West Bromwich.—At the meeting of the West Bromwich Town Council last Wednesday, the Gas Committee reported that they had resolved to amend the existing scale of charges for gas by making the price to all consumers of a million cubic feet and upwards per quarter for motive power purposes 1s. 9d. per 1000 cubic feet, as from the commencement of the current quarter. Considerable discussion ensued; some objection being made to the proposal. Mr. Bushell said the average cost of gas in the borough was 2s. 2d. net per 1000 feet; and if the resolution of the Committee was approved, they would be selling it at less than cost price. He wished to disclaim any responsibility for the resolution, which he formally moved. Mr. Wilson, in seconding, said the gas in the holders did not cost the Committee 1s. per 1000 feet; and he argued that it would pay them to supply it at 1s. 9d. simply because they produced it when their plant would otherwise be idle. The report was adopted by 16 votes to 6.

Water Supply in Dunedin.—The existing water supply in Dunedin (New Zealand) is about to be considerably extended, by carrying the mains to the suburban districts on the higher levels. The Colonial Government have just sanctioned a loan for this purpose. At present the residents in these suburbs are dependent upon tanks, &c., for storing the rainwater, and in dry seasons these are liable to prove ineffectual for their wants.

Explosions of Gas.—Owing to interference with a chandelier in a house in Victoria Terrace, Longsight, Manchester, a large escape of gas occurred, which recently caused an explosion, injuring two ladies and a little boy, and doing serious damage to the house and furniture. One of the ladies—a Mrs. Trenbath—on recovering, explained that she discovered a smell of gas, and, in order to avoid an accident, turned the gas off at the meter, and opened the window. Afterwards she is said to have attempted to find out with a lighted match where the escape was, with the result above stated. She was standing on a step-ladder at the time, and was thrown violently to the ground, and received burns of a severe nature. A serious leakage of gas from the main took place last Saturday night in Great Brickkiln Street, Wolverhampton, and filled the cellars of three houses. Owing, probably, to a lighted match being thrown down, the gas in the street ignited, blew up the pavement for 30 yards, and set fire to the woodwork in the lower portion of the houses. A section of about 50 yards of electric cable under the pavement was destroyed.

Huddersfield Corporation Undertakings.—The retiring Mayor of Huddersfield (Alderman G. W. Hellawell) last Friday addressed his colleagues on the municipal work of the past year. Reviewing the operations of the different departments, he said there had been substantial progress in the supply of electricity. A large reduction last year in the price charged led to an increase of consumers; the numbers being in 1899 1010, and in the present year 1282. The profit for the year ended December last was £9040, or 7½ per cent. upon the capital employed; and the net balance was £2828, which had been placed to the depreciation and reserve fund, which now stood at £5684. The gas-works had yielded a total income of £95,357, of which £26,082 was gross profit, allocated as follows: Interest, £13,369; redemption of capital, £2641; to the relief of the rates (equal to 3d. in the pound), £3433; carried to reconstruction account, £6639. The gas consumed for the year ended March 31 last was 580,065,000 cubic feet, against 539,475,000 cubic feet in 1899—an increase of 7½ per cent. There were 5114 penny-in-the-slot meters in use, from which had been collected £6123 in copper, weighing 13 tons 13 cwt. An increase of wages and a week's holiday (exclusive of Bank Holidays) to the stokers had cost £300 per annum. Owing to the increased price of coal, gas supplied for stoves, engines, and public lighting had been advanced from 2s. to 2s. 3d. per 1000 cubic feet. The incandescent system had been adopted for public lighting nearly all over the borough, and had given general satisfaction. The Water Committee had reported that the quantity of water in store at Blackmoorfoot was 323 million gallons, compared with 388 millions at this time last year. The total population served with water by the Corporation was 153,080, against 152,255 last year. The income from the water-works for the year was £53,095; and the profit £5453.

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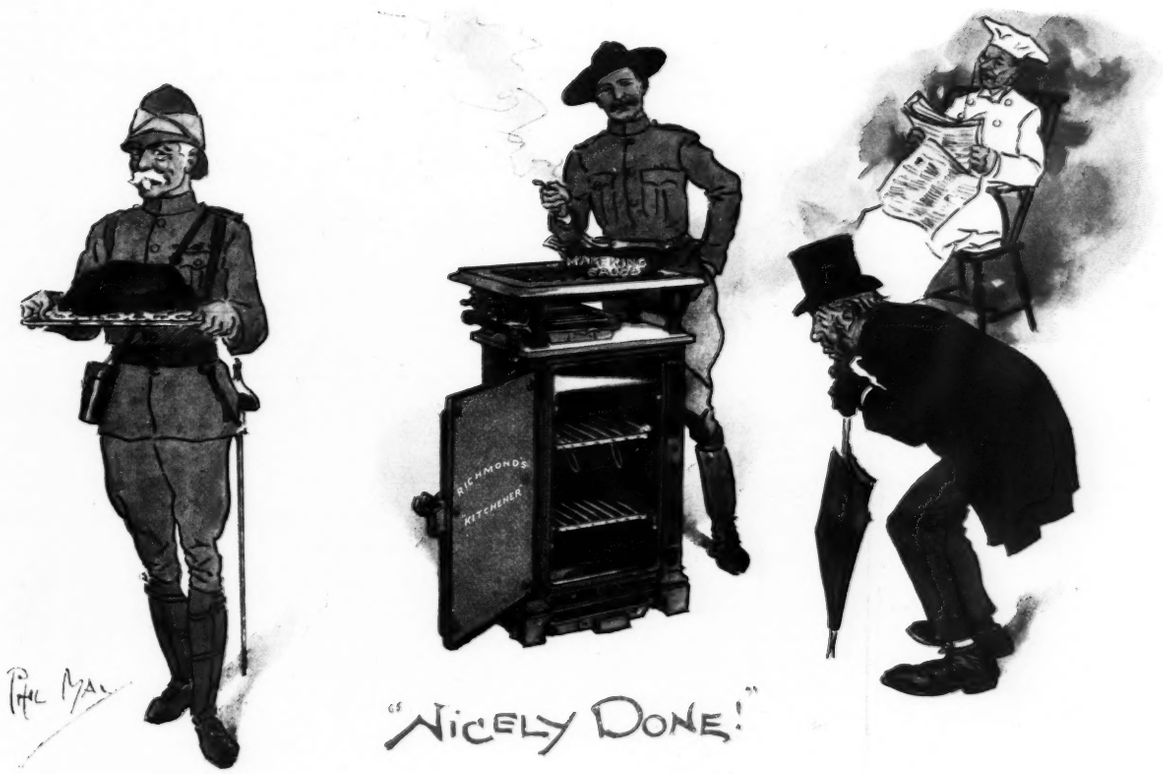

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[P.T.O.

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Waste of Good Water in Colliery Workings.—The colliery sinkings through the Bunter Conglomerates near Penkridge, Staffordshire, are impeded by the superabundance of water, to deal with which a special shaft, with powerful pumping machinery, is necessary. The water in question is unequalled in the country for its purity and softness; and millions of gallons of it will soon be running to waste.

The Issue of Gas Stock to Consumers.—In the "JOURNAL" for the 23rd ult., attention was called to the fact that the Crystal Palace District Gas Company were offering to their consumers an issue of £20,000 of ordinary stock, which might be taken by them in amounts of not less than £5, or multiples thereof, at the low price of £112 per cent.; the quotation in that number of the "JOURNAL" being 115-120. The consumers evidently thought this was "good business;" for applications were received for no less than £55,800. The allotment of the stock was made last Friday.

Hexham Gas Company.—The annual report of the Directors of this Company just issued states that the accounts show a profit of £1793. The Directors propose to pay a dividend of 10 per cent. on the original shares, and 7 per cent. on the ordinary "B" shares, and to carry forward a balance of £311. They state that the greatly increased price of coals and other materials has made it necessary to reduce the discount allowed to gas consumers to the extent of 5 per cent.; and they hope that, with the additional revenue to be derived from residuals, this will enable them to meet the needs of the ensuing year.

Teignmouth Water Supply.—The Teignmouth District Council seem to be really alive at last to the fact that the water supply of the town is not satisfactory. A deputation representing the tradesmen and leading residents recently waited on the Council to point out the risks which were being run of a water famine in the event of a breakdown of the pumping arrangements, and the general inconvenience and danger of the present intermittent supply. As the result, the Council unanimously decided to take steps to ascertain whether the Torquay Corporation could furnish a supply of water, and on what terms. It was also decided to inquire into the possibilities of a supply from another source.

The Briton Ferry Urban District Council have applied to the Local Government Board for power to borrow £1902 for gas-works and £4254 for water-works purposes.

Mr. Kinloch Anderson, who has been for a long time a Magistrate of Edinburgh, and Convener of the Works Committee of the Edinburgh and Leith Gas Commission, was re-elected to the Edinburgh Town Council last Tuesday.

The Welsbach Incandescent Gas-Light Company, Limited, have just issued a public lighting catalogue for 1900-1901. It is a very well printed pamphlet, of convenient size, containing effective illustrations of he Welsbach-Kern and "C" burners, governors, lamps, lanterns, columns, &c.

At the fifth of November carnival at Littlehampton, Messrs. Richmond and Co.'s gas-illuminated advertisement tableaux, "Bringing his Goose to be Cooked," which was entered by Mr. A. W. Elton, Manager to the Gas Company, in conjunction with Messrs. Richmond, attracted a great deal of attention.

Attention may be directed to the notification which appeared last week that, on the 22nd inst., Messrs. Nichols, Howes, Young, Alder, and Co. will sell by public auction £13,000 of general capital stock of the Bristol Gas Company, bearing a maximum dividend of 5 per cent. per annum, and £6300 of new 4 per cent. debenture stock, in £100 lots.

NOTICE TO ADVERTISERS.—COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office *not later* than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received not later than the FIRST POST on SATURDAY.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined. Purity and uniformity of quality guaranteed.
JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON BUILDINGS,
OLD BROAD STREET,
LONDON, E.C.
ANDREW STEPHENSON, AGENT. All communications re Oxide to the Company as above.

WINKELMANN'S
"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for use in GAS-WORKS.
ANDREW STEPHENSON,
182, Palmerston Buildings,
Old Broad Street,
"Volcanism, London." London, E.C.

BROTHERTON & CO.
Offices: Commercial Buildings, LEEDS.
Correspondence invited.

ENRICH your Gas with cheap Benzol,
Specially prepared, free from sulphur. At to-day's Price of Benzol, ILLUMINATING POWER costs less than ONE-THIRD OF A PENNY PER CANDLE.
Apply to SADLER AND CO., MIDDLESBROUGH.

AMMONIACAL LIQUOR wanted.
BROTHERTON AND CO., Ammonia Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SADLER & CO., Ltd., Middlesbrough,
Tar Distillers and Tar Colour Manufacturers. BENZOL specially prepared for Gas Enrichment free from Sulphur. Pure Hydrated OXIDE OF IRON for Purifying Gas either for Sale or Lent on Hire. Always Buyers of GAS TAR and AMMONIACAL LIQUOR.

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO., Chemical
Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special attention to Repairs.
Before placing Orders, please write for Estimate.
Telegraphic Address: "SATURATORS, BOLTON."

GAS TAR wanted.
BROTHERTON AND CO., Tar Distillers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

PATENTS FOR INVENTIONS.
Messrs. J. C. CHAPMAN & CO., Chartered Patent Agents, ADVISE ON ALL MATTERS CONNECTED WITH ABOVE.
Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

PORTER & CO., Gowts Bridge Works,
LINCOLN, Engineers, Ironfounders, and Contractors for the erection of Gas-Works for Towns, Villages, Mansions, Manufactories, Collieries, and Isolated Buildings at home and abroad. Manufacturers of Retorts and Fittings, Condensers, Scrubbers, Purifiers, Valves, &c.; also of Girders, Wrought and Cast Iron Tanks, Iron Roofs, &c.
Telegraphic Address: "PORTER, LINCOLN."
[For Illustrated Advertisement, see Nov. 6, p. 1174.]

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM; and 45 & 47, Westminster Bridge Road, LONDON, S.E.
First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.
Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

SULPHURIC ACID.
JOHN NICHOLSON & SONS, Limited,
Chemical Works, Leeds, specially produce this ACID from SULPHUR, for making SULPHATE OF AMMONIA of high quality and *good* colour. Delivery in our own Railway Tank-Waggons or Carboys. Highest references and all particulars supplied on application.

BY the adoption of Cripps's Bye-Pass
VALVES inside your Purifiers, you can relieve the Back-Pressure in the Lower Tiers when the Purifying Material gets hard. They are extremely useful and economical.
Sole Makers: C. & W. WALKER, LIMITED, Midland Iron-Works, Donnington, near Newport, SHROPSHIRE.

SULPHURIC ACID for Sale.
BROTHERTON AND CO., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

TO GAS AND WATER OFFICIALS.
HIGH-CLASS Cycles at reasonable and low Prices. Guaranteed for Twelve Months. Sent on approval. For Cash or Gradual Payment System. Send for Catalogue, Post Free.
MELROSE CYCLE COMPANY, COVENTRY.

NEW GAS PLANT CEMENT.
JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
For all Joints in connection with Oil Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

APPLICANTS for the position of Meter Reader and Collector advertised in the last issue of the "JOURNAL" (to "GAS") are THANKED FOR THEIR APPLICATIONS, and informed that the VACANCY HAS BEEN FILLED.

WANTED by Advertiser (Age 26), a Situation on a Gas-Works. Well up in the Distributing Department; also in the Office and Show-Room. Experience Ten Years. Excellent Testimonial.
Address F. HOBOURN, Elm Road, WISBECH.

WANTED, Working Manager for small Gas-Works. Annual make 7 to 8 million feet. Must understand Gas-Fitting. House, Gas, and Fire free.
Applications to be sent, with recent Testimonials, Age, and Wages required, to the SECRETARY, Gas Company, TORRINGTON.

GAS PURIFICATION.

OXIDE OF IRON BOG ORE.
BALE & CO.'S Oxide of uniform quality.
SPECIAL FIRE CEMENT, OXIDE PAINTS, OILS, SULPHURIC ACID, &c.
120 and 121, NEWGATE STREET, LONDON, E.C.
Telegrams: "BOGORE, LONDON."

CANNEL, COAL, ETC.
JOHN ROMANS & SON, EDINBURGH,
Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application.
No. 30, ST. ANDREW SQUARE, EDINBURGH, } SCOTLAND.
NEWTON GRANGE, NEWBATTLE, DALKEITH, }

IMPORTANT NOTICE
TO ACCOUNTANTS OF GAS AND OTHER LARGE COMPANIES.
A GENTLEMAN, who has an Established Agency of Seven Years' standing for the CHANGING OF ENGLISH COPPER COIN, is prepared to take One Thousand Pounds' worth, or more, per week.
Address for Interview and to arrange Terms, J. A., 65, Lancefield Street, WEST KILBURN.

WANTED, a Working Foreman at the Gas-Works, Newport, Salop. House and Garden, Gas, and Coals free. Married Man preferred.
Apply, stating Age, Wages required, and References, to Mr. HEANE, Secretary, Newport, SALOP.

WANTED, by a Gas Engineering Firm, a thoroughly competent DRAUGHTSMAN, conversant with Retort-House Ironwork, Regenerative Settings, and Conveying and Elevating Plant.
State Age and Salary required to Box 2791, SELL'S, FLEET STREET, E.C.

DRAUGHTSMAN wanted for a Gas-Works in the North of England, with good all-round Experience.
Apply, immediately, by letter, stating Age, Salary, and full Particulars, to No. 3594, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WORKING Manager wanted for small Gas-Works, 30 miles from London. Wages to commence, 27s., House, Fuel, &c.
Apply, by letter, to No. 3595, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS-FITTER, &c.
WANTED, by the Wellington (Salop) Coal and Gaslight Company, a SMART YOUNG MAN who would be willing to make himself useful (Meter Inspection and Service Laying).
Two *bona-fide* References required. State Wages expected.
H. TAPLAY,
Engineer and Manager.
Gas Offices, Wellington,
Nov. 2, 1900.

TO BE LET on Hire—
FACING MACHINE, for facing *in situ* Self-Sealing Retort Mouthpieces any shape or size, O, Oval, or Circular.
PULSOMETER, Size No. 5, with 4-in. suction and 3-in. delivery. Steam-Pipe ¾ in. diameter. Discharge 10,000 Gallons per hour.
Write J. WRIGHT, Bridge House, BLACKFRIARS BRIDGE, E.C.

HONG KONG AND CHINA GAS COMPANY, LIMITED.

WANTED, a Resident Engineer with a thoroughly practical knowledge of all Modern Improvements in Gas Manufacture. Not under 28 Years of Age. Salary £500 per annum in Gold, with House or equivalent. Free passage out and home. Term of engagement, Five Years.

Apply, by letter, with *copies* of recent Testimonials, and full Particulars of previous Experience (giving dates), to the SECRETARY, 1'8, Gresham House, LONDON, E.C.

"CUTLER'S" Condenser, ¾ million day, equal to new; weight 12 tons; accept £100 on rail, Berkshire, if sold promptly.

J. F. BLAKELEY, Thornhill, DEWSBURY.

CORNISH Boiler for Sale, 15 ft. by 5 ft., insured 60 lbs. Pressure. Can be seen working.

JOHN E. WILLIAMS AND CO., Lower Tebbutt Street, MANCHESTER.

FOR SALE—5000 feet Gasholder, equal to new, with Four Columns complete, together with a quantity of Gas Plant. Any reasonable offer entertained.

H. GRAVES, Brandon, SUFFOLK.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.

J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

NEWCASTLE-UPON-TYNE AND GATESHEAD GAS COMPANY.

FOR SALE—260 22 in. by 15 in. and 135 20 in. by 14 in. second-hand ∩-shaped Retort MOUTHPIECES, fitted complete with Tangyes Patent Lids, 18 inches diameter.

Can be inspected on application to Mr. T. Hardie, Manager, Gas-Works, Redheugh, Gateshead-on-Tyne.

Offers to be addressed to the SECRETARY, 35, Grainger Street West, NEWCASTLE-ON-TYNE.

FOR SALE—Complete Gas Plant, consisting of One Set of Two PURIFIERS, 9 ft. by 5 ft., and Connections; One 4-inch STATION METER; Fifteen ∩ MOUTHPIECES and all Fittings, HYDRAULIC MAIN, ASCENSION-PIPES, and DIP-PIPES; One 20-feet Single-Lift GASHOLDER, 31 feet diameter. All in good condition, and can be seen in position at the Bottoms Mill, Birkenshaw. To be pulled down and removed by the Purchaser. Offers wanted.

Apply ERNEST FOSTER, at the Mills.

SCARBOROUGH GAS COMPANY.

SALE BY TENDER OF NEW ORDINARY STOCK.

IN PURSUANCE OF THE SCARBOROUGH GAS ACT, 1895.

NOTICE is Hereby Given, that it is the intention of the Directors of this Company to SELL BY TENDER NEW ORDINARY STOCK of the Company, to the amount of £8000, or such greater or less amount as shall, with premiums, realize the sum of £9757 10s. 3d., such Stock to bear a maximum Dividend of £5 per cent. per annum, and to be paid up in full on or before the 1st day of January, 1901; being the balance of the Additional Capital authorized to be raised under the powers of the above-named Act, by a Resolution passed at a Meeting of the Proprietors of the Company, specially convened for the purpose, and held on the 26th day of June, 1895.

Particulars and Condition of Tender may be obtained on application at this Office; and sealed Tenders must be sent in not later than Twelve o'clock at noon on the 1st day of December, 1900.

By order,
J. HOLLIDAY,
Secretary.

Scarborough Gas Company's Offices,
32, Westborough, Scarborough, Oct. 22, 1900.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held PERIODICALLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by AUCTION of GAS and WATER STOCKS and SHARES under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
SOUTHEND GAS COMPANY.

NEW ISSUE OF £5000 NEW ORDINARY STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Dec. 4, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
GRAYS GAS COMPANY, LIMITED.

NEW ISSUE OF 250 £10 "B" SHARES.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Dec. 4, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

HIGH-PRICED COAL.

SMALL Gas-Works Authorities should immediately adopt an EXHAUSTER, and thus make probably at least 750 cubic feet of gas more from each ton of Coal carbonized. Several small sets *in stock*, both New and Second-hand.

Address J. FIRTH BLAKELEY AND CO., Thornhill, DEWSBURY.

J. FIRTH BLAKELEY & CO., Thornhill, Dewsbury, have FOR SALE:—

One Set of Three 6-ft. PURIFIERS.
One ,, Two 8-ft. ,,
One ,, Four 8-ft. ,,
One ,, Four 16-ft. by 12-ft. PURIFIERS.
Four 5-inch ANNULAR CONDENSERS.
Four 10-inch ,, ,,
Six 16-inch ,, ,,
"Cutler" ¾ million WATER CONDENSER.
Wrought-Iron TOWER SCRUBBERS, 3 ft. by 14 ft., 3 ft. 6 in. by 27 ft., and 7 ft. by 32 ft.
Cast-Iron TOWER SCRUBBERS, 3 ft. 6 in., 5 ft., and 6 ft. diameter.
EXHAUSTERS, 2000 to 60,000 Cubic Feet per hour.
"Holmes" & "Clapham" WASHER-SCRUBBERS.
"Livesey" & "Cripps" WASHERS.
4-in., 6-in., 8-in., and 10-in. STATION METERS.
Splendid GASHOLDER, 50 ft. by 20 ft.
RETORT IRONWORK, MODERN HYDRAULICS.
Telegrams: "BLAKELEY, THORNHILL LEES."

TYNEMOUTH GAS COMPANY, NORTH SHIELDS.

RETORT-HOUSE ROOF.

THE Directors of the Tynemouth Gas Company invite TENDERS for the supply and erection complete of a ROOF, for their No. II. Retort-House. The Span is 75 feet, and Length 297 feet.

Arrangement and full Detail Drawings, Specification, and Quantities, may be seen at the Engineer's Office, Gas-Works, North Shields, on and after Friday, the 16th inst., upon payment of £3 3s., which will be returned upon receipt of a *bonâ-fide* Tender.

Tenders, addressed to the undersigned, to be delivered not later than Friday, the 30th inst.

W. HARDIE,
Engineer and Manager.

Gas-Works, North Shields,
Nov. 13, 1900.

ATHERTON URBAN DISTRICT COUNCIL.

TENDERS are invited for the Work and Materials required in the construction of a RETORT-STACK and RETORT-SETTINGS at the Gas-Works, Atherton.

The Specification and Drawings may be seen on application to the undersigned, and at the Offices of Messrs. Thomas Newbigging and Son, 5, Norfolk Street, Manchester.

Copies of the Bill of Quantities may be obtained from the latter on payment of Two Guineas, which will be returned on receipt of a *bonâ-fide* Tender.

Tenders, endorsed "Retort-Stack, Contract No. 2," to be sent so as to reach me not later than noon on Thursday, the 22nd of November, 1900.

The lowest or any Tender not necessarily accepted.

D. SCHOFIELD,
Clerk to the Council.

Atherton, near Manchester,
Nov. 9, 1900.

COUNTY BOROUGH OF HALIFAX.

TO ROOF BUILDERS.

THE Gas-Works Committee of the Halifax Corporation invite TENDERS for the supply and erection of 128 ROOF TRUSSES of about 37 feet Span over their Coal-Store, Bank Bottom.

Full Particulars, Form of Tender, and Print may be obtained on application to Mr. Thomas Holgate, M.Inst.C.E., Engineer, Gas-Works, Halifax, on payment of One Guinea, which will be returned on the receipt of a *bonâ-fide* Tender.

Tenders, endorsed "Coal-Store Roof," must be sent to the undersigned not later than Ten o'clock a.m., on Wednesday, the 28th of November, 1900.

The person whose Tender is accepted will be required to observe the Fair Contracts Clauses adopted by the Corporation.

The Committee do not bind themselves to accept the lowest or any Tender.

By order,
KEIGHLEY WALTON,
Town Clerk.

Now Ready. Net Price: Cloth Bound, 12s. 6d.; Morocco Gilt, 18s.

GAS COMPANIES'

BOOK-KEEPING.

A Practical Treatise on the Keeping of Gas Companies' Accounts.

By

JOHN HENRY BREARLEY & BENJAMIN TAYLOR,

OF LONGWOOD.

The only complete Treatise on Gas Companies' Book-Keeping ever published.

This book will be found invaluable to those desirous of obtaining a thorough grasp of Gas Companies' Book-Keeping and Accountancy.

A complete set of Transactions are dealt with; the same being entered into the various Books, and posted into the Ledgers. A Model Balance-Sheet is prepared from the set of transactions and postings.

Forms and subsidiary books are illustrated and described. The linking together of the various books is shown at a glance by means of a Chart.

LONDON:
WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

IMPERIAL CONTINENTAL GAS ASSOCIATION.

(INCORPORATED BY ACT OF PARLIAMENT.)

NOTICE is Hereby Given, that the HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Association was held at the City Terminus Hotel, Cannon Street, London, E.C., on Tuesday, the 6th inst.,

THOMAS HENRY GOODWIN NEWTON, Esq., in the Chair, when the following RESOLUTIONS were unanimously passed:—

"That the Report of the Directors upon the affairs of the Association be received, adopted, and entered upon the Minutes."

"That a Dividend of 5 per cent. for the Half Year ended the 30th of June last be declared upon the £3,800,000 Capital Stock of the Association, and that the same be payable, free of Income-Tax, on and after the 18th of November instant."

Cordial votes of Thanks were passed to the Directors for their able management of the affairs of the Association, to the Chairman for his conduct in the Chair, and to the Staff in London and on the Continent.

By order of the Board,
ROBERT W. WILSON,
Secretary.

21, Austin Friars, London, E.C.,
Nov. 7, 1900.

By order of the Directors.

REDHILL GAS COMPANY.

MR. HARRIE STACEY is favoured with Instructions to SELL BY AUCTION at the Market Hall, Redhill, on Thursday, the 29th of November, 1900, at Seven o'clock p.m. precisely,

£7500

FIVE PER CENT. ORDINARY "B" STOCK, subject to the Sliding-Scale, in Lots of £50 and £100 each.

Particulars and Conditions of Sale to be obtained at the OFFICES of the COMPANY, Brighton Road, REDHILL; of Messrs. RADCLIFFE, CATOR, & HOOD, Solicitors, 20, Craven Street, CHARING CROSS, W.C.; and of Mr. HARRIE STACEY, Auctioneer and Land Agent, REDHILL and REIGATE.

Just Published, with nearly 300 Illustrations, Royal 8vo, 18s.

Edited by C. E. GROVES, F.R.S., and WM. THORP, B.Sc.

GAS LIGHTING,

Describing the Manufacture of Gas and its Application to the purposes of Illumination.

By CHARLES HUNT,

Manager of the Birmingham Corporation Gas-Works.

LONDON:
J. & A. CHURCHILL, 7, GREAT MARLBOROUGH STREET.

HARDMAN & HOLDEN, LD.

ESTABLISHED 1820.

SULPHURIC ACID.

GUARANTEED absolutely free from Arsenic and of excellent Purity. Specially prepared for Sulphate of Ammonia Manufacturers.

Works: BLACKBURN; Miles Platting and Clayton, MANCHESTER.

Head Office: Miles Platting, MANCHESTER.

Inquiries Solicited.

WELDON MUD

FOR

GAS PURIFICATION.

For use in the

RECOVERY OF SULPHUR,

ALSO

Removal of last Traces of SULPHURETTED HYDROGEN in catch position.

Full Particulars on application to the Patentees:

GAS DESULPHURIZATION CO.,

— LIMITED. —

1, FENCHURCH AVENUE, LONDON, E.C.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,

LIMITED,

NEWBATTLE COLLIERIES,

DALKEITH, N.B.

JAMES OAKES & CO.

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with Bolts, Nuts and Covers, and rendering Leakage impossible.

GAS-FITTINGS.

BURNERS

Welsbach Pattern

per **7/6** Doz.

WRITE FOR CATALOGUE.

WHOLESALE FITTINGS COMPANY

80, Commercial Road, London, E.

INCANDESCENT

HOLMSIDE

GAS COALS.

Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton . . . 11,205 Cubic Feet.
Illuminating Power 16 1/10 Stand. Sperm Candl.
Coke (of good & pure quality) 13¾ Cwt. per Ton.
Sulphur . . . . . A little over 1 per Cent.
Ash . . . . . Under 1 per Cent.
Tar . . . . . 163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor 103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR

PELTON GAS COALS.

Present Daily Produce available 3000 Tons.

Of equal quality to the "Holmside" Coal, and also very largely used by many Gas Companies at Home and Abroad.

Both descriptions are shipped at Tyne Docks, and Dunston Staiths, River Tyne, also at North and South Docks, Sunderland.

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,

HOLMSIDE & SOUTH MOOR OFFICES,

NEWCASTLE-UPON-TYNE.

DISPENSE WITH CANNEL COAL
and
INCREASE YOUR ILLUMINATING POWER
by using the

WHESSOE-MUNICH BENZOL CARBURETTER

The Cheapest and Best in the Market.

The Managers of Tynemouth, Middlesbrough, and Darlington Gas-Works are much pleased with it, and would not be without it.

Apply to the Sole Makers:
THE WHESSOE FOUNDRY COMPANY, LIMITED, DARLINGTON.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD

BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.

RAVENSTHORPE, NEAR DEWSBURY.

BOLDON GAS COALS.

Yield of Gas per Ton. . 10,500 Cubic Feet.
Illuminating Power . . 16·9 Candles.
Coke . . . . . 66·7 Coke.
Sulphur . . . . . 0·86 Sulphur.
Ash . . . . . 2·04 Ash.

As per Analysis by
Mr. JOHN PATTINSON, F.I.C., F.C.S.

For Prices, &c., apply to
W. H. PARKINSON,
THE HARTON COAL CO., LTD.,
NEWCASTLE-ON-TYNE.

Telegraphic Address: "PARKINSON, NEWCASTLE."

THOMAS TURTON AND SONS, LIMITED,

SHEAF WORKS, SHEFFIELD,

MANUFACTURERS OF

FILES OF BEST QUALITY FOR ENGINEERS.

STEEL OF ALL DESCRIPTIONS.

SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS,
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.

LONDON OFFICE:
90, CANNON STREET, E.C.

THORNLEY GAS COALS

WORKED BY THE

WEARDALE IRON & COAL CO., LD.

OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by
Messrs. J. & H. S. PATTINSON.

Yield of Gas per Ton . . 10,500 Cub. Ft.
Illuminating Power . . . 16·9 Candles.
Coke (of good quality) . . 67·5 per Cent.
Sulphur . . . . . 0·58 „
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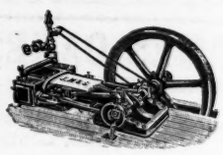

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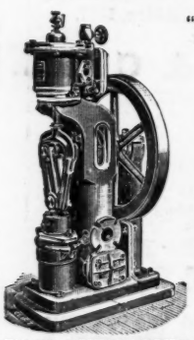

Fig. 705. "SINGLE RAM" STEAM-PUMP.

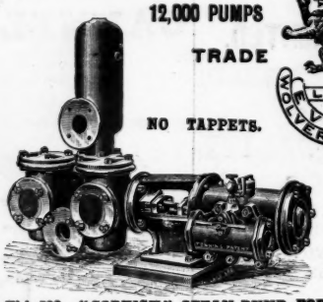

Fig. 595. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

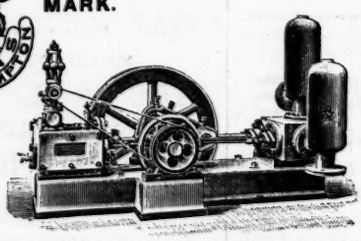

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

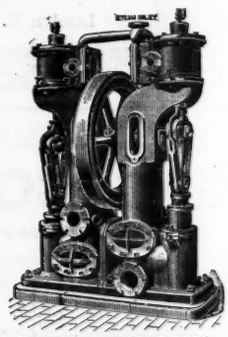

Fig. 713. "DOUBLE-RAM" STEAM-PUMP.

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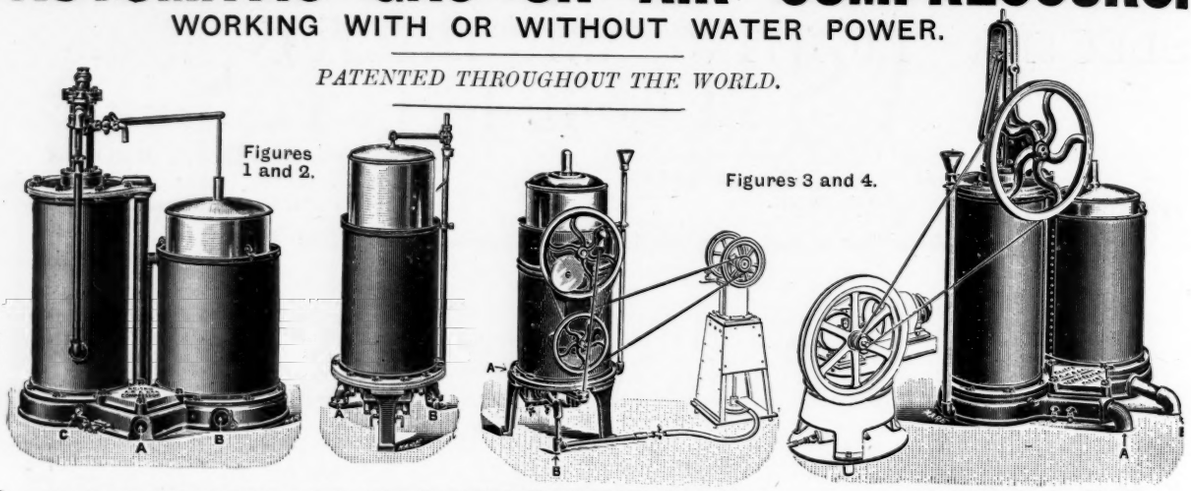

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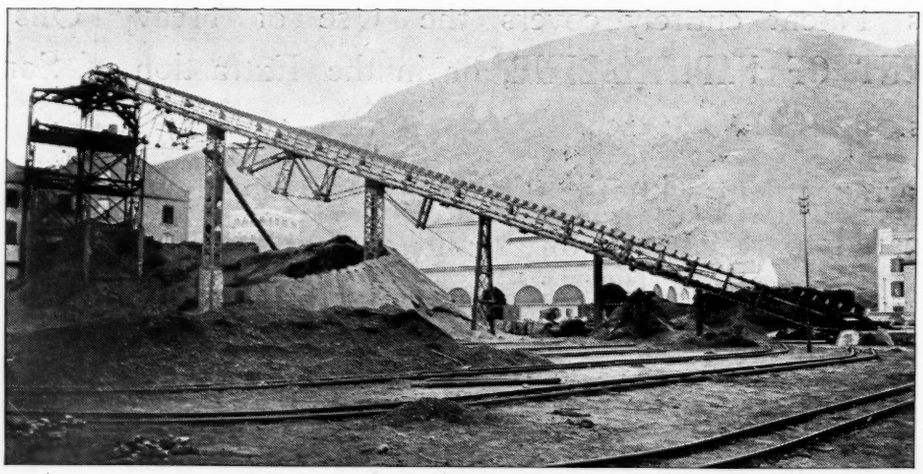

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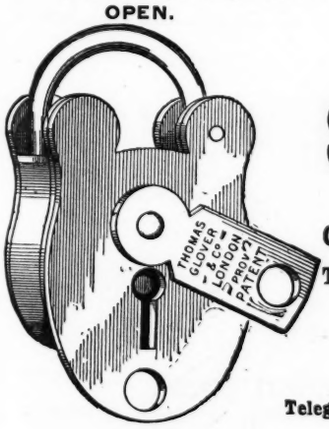

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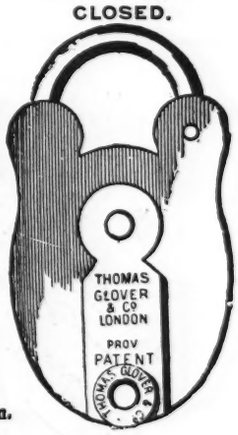

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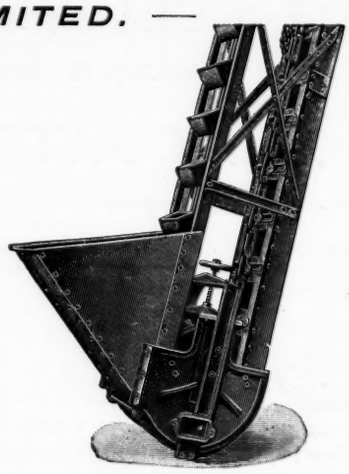

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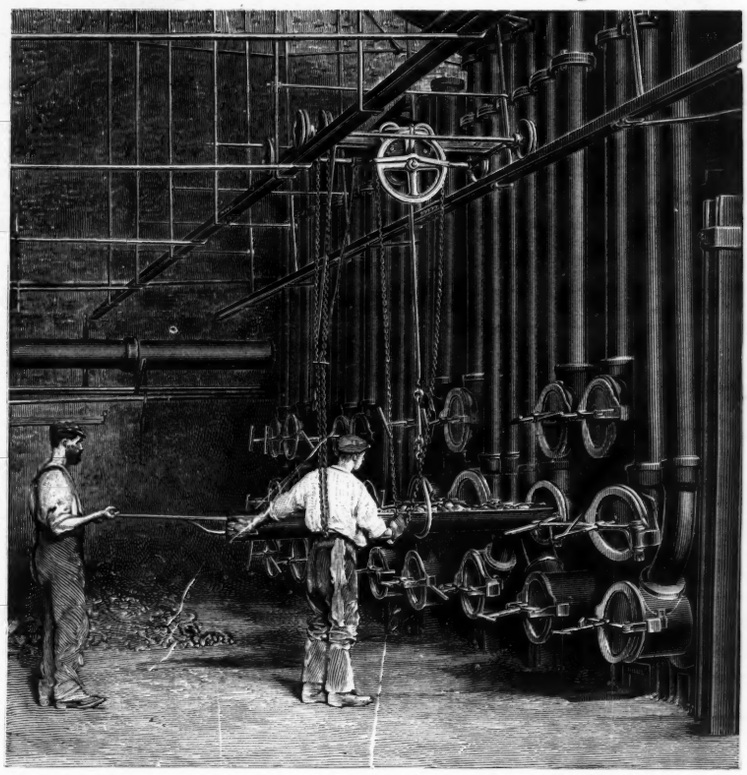

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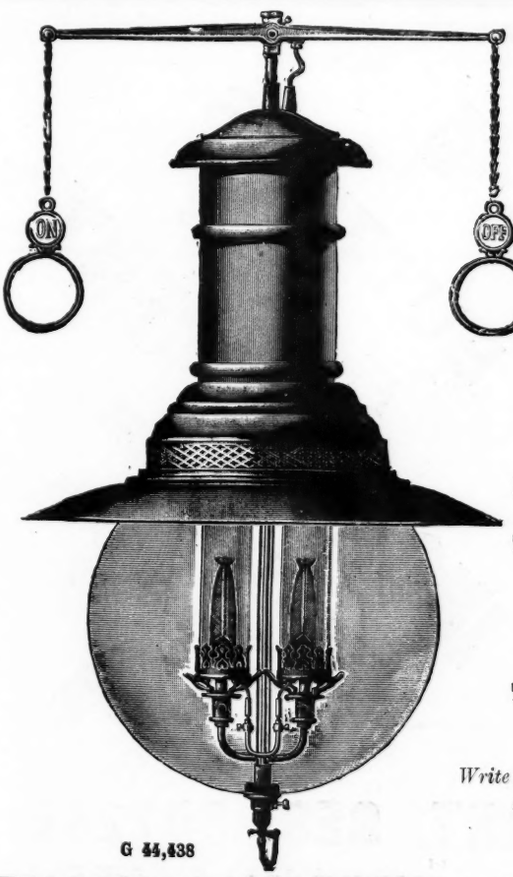

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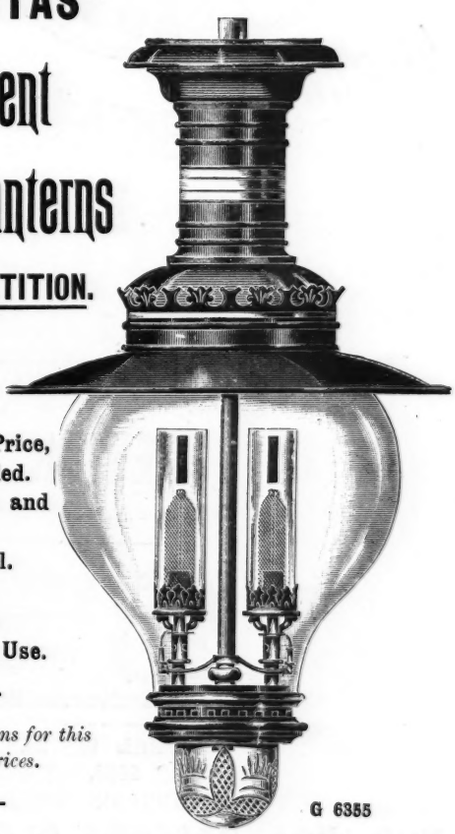

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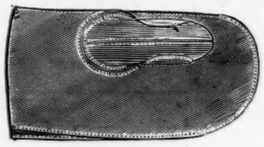

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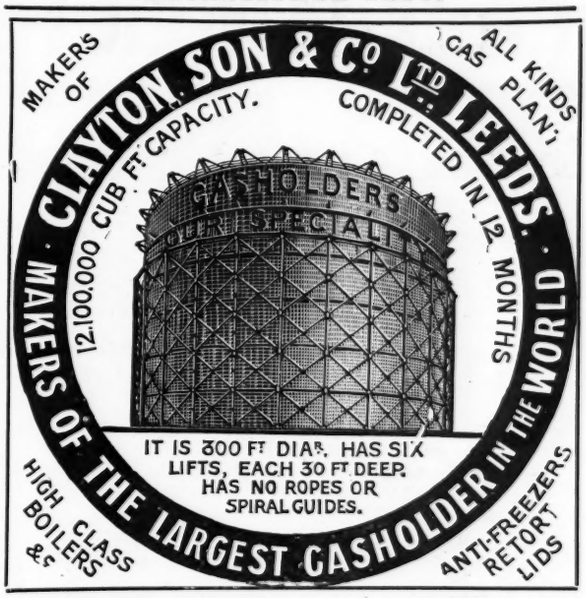
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